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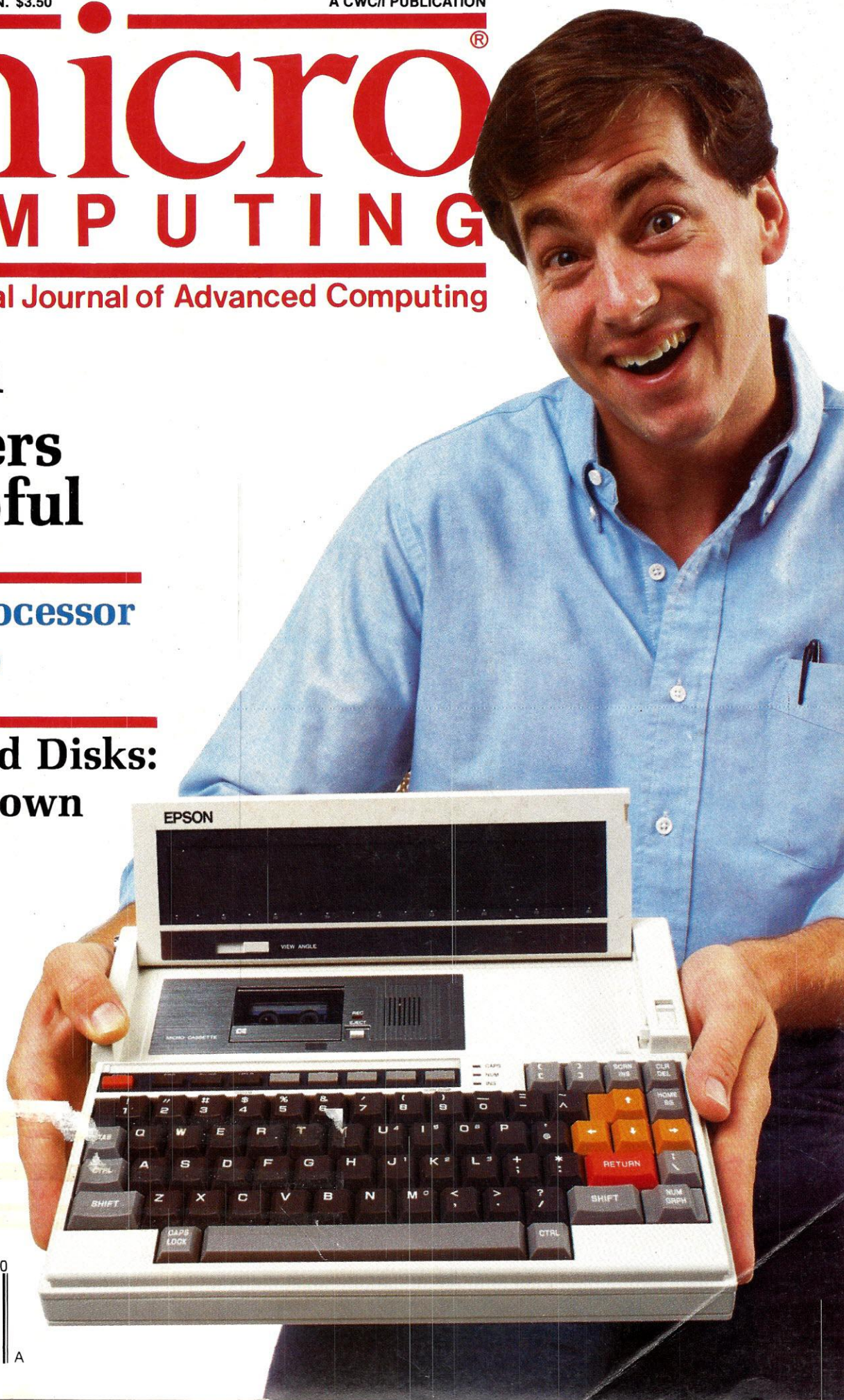
The Practical Journal of Advanced Computing

## Epson Delivers A Lapful

### Word Processor Roundup

### Mac Hard Disks: A Trip Down Memory Lane

### A Look At Laser Disks





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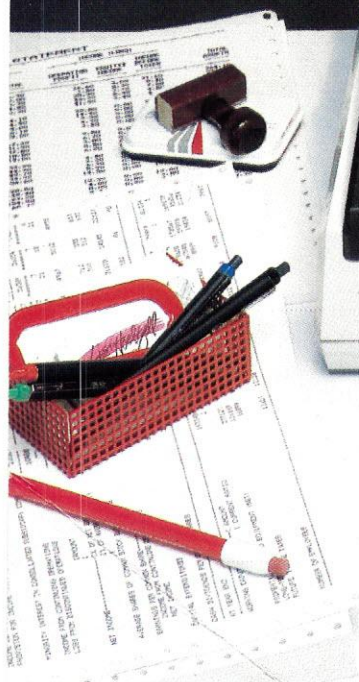
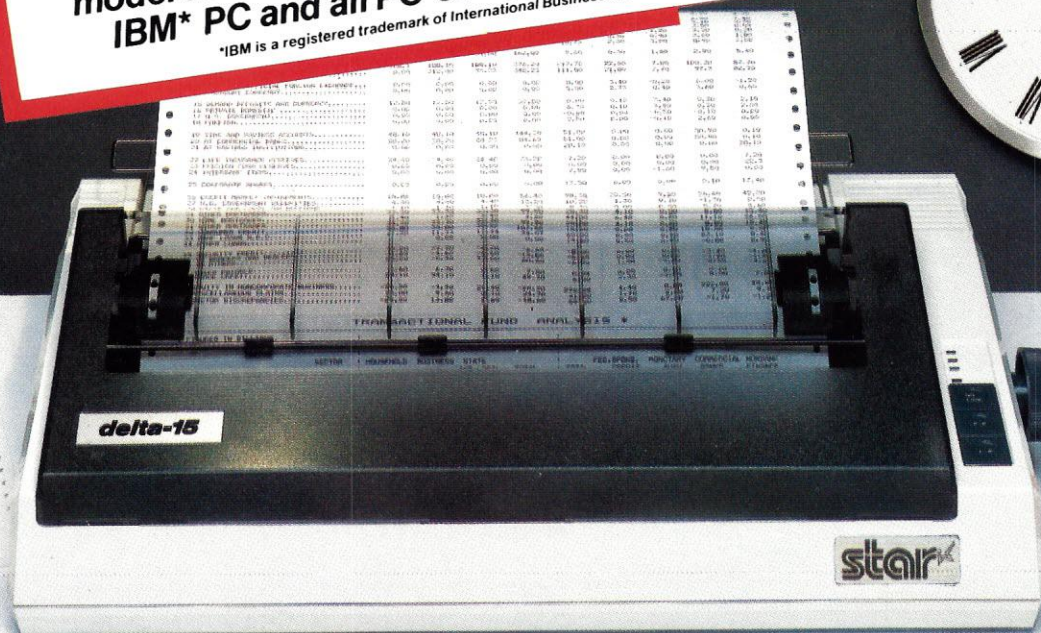
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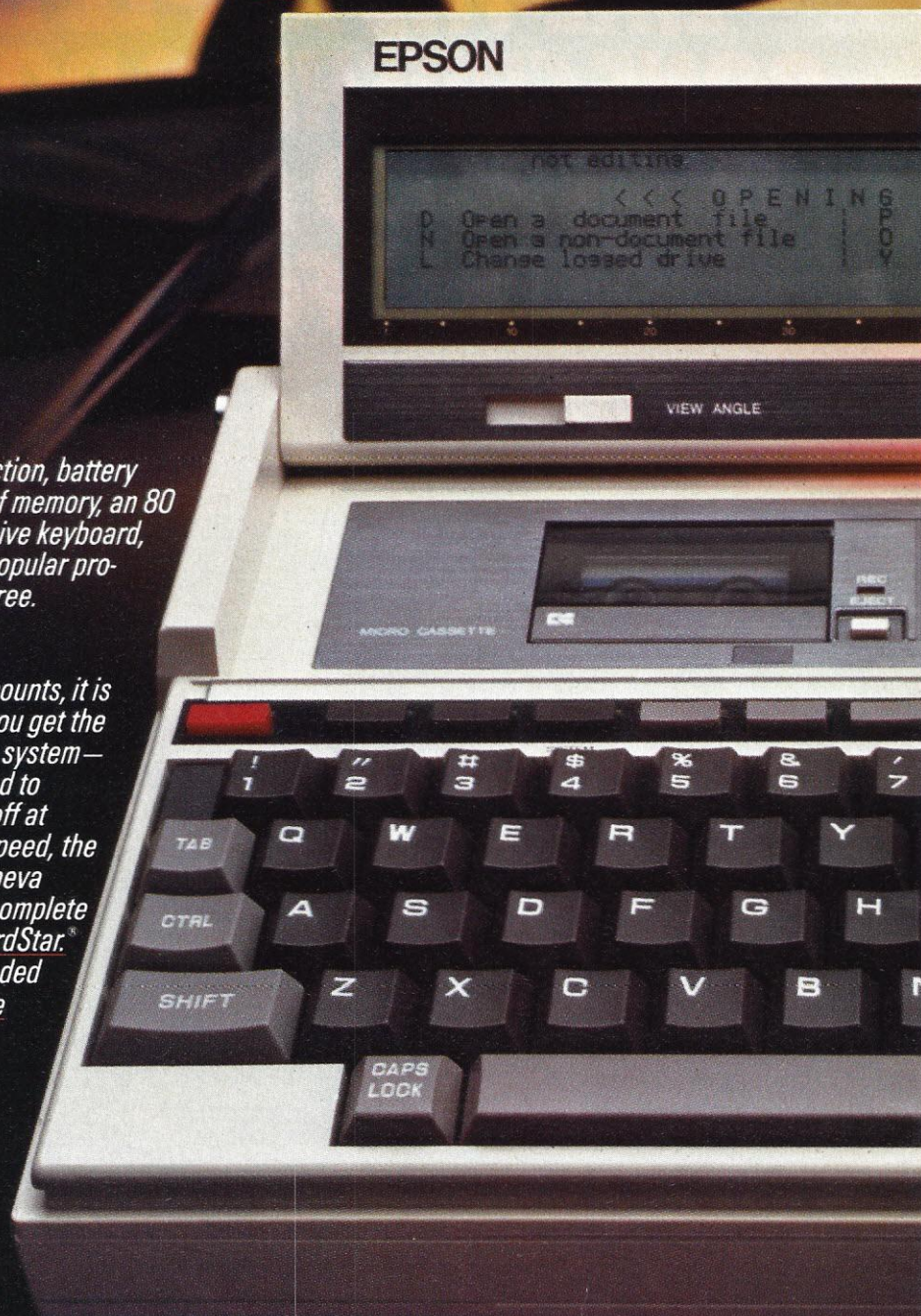
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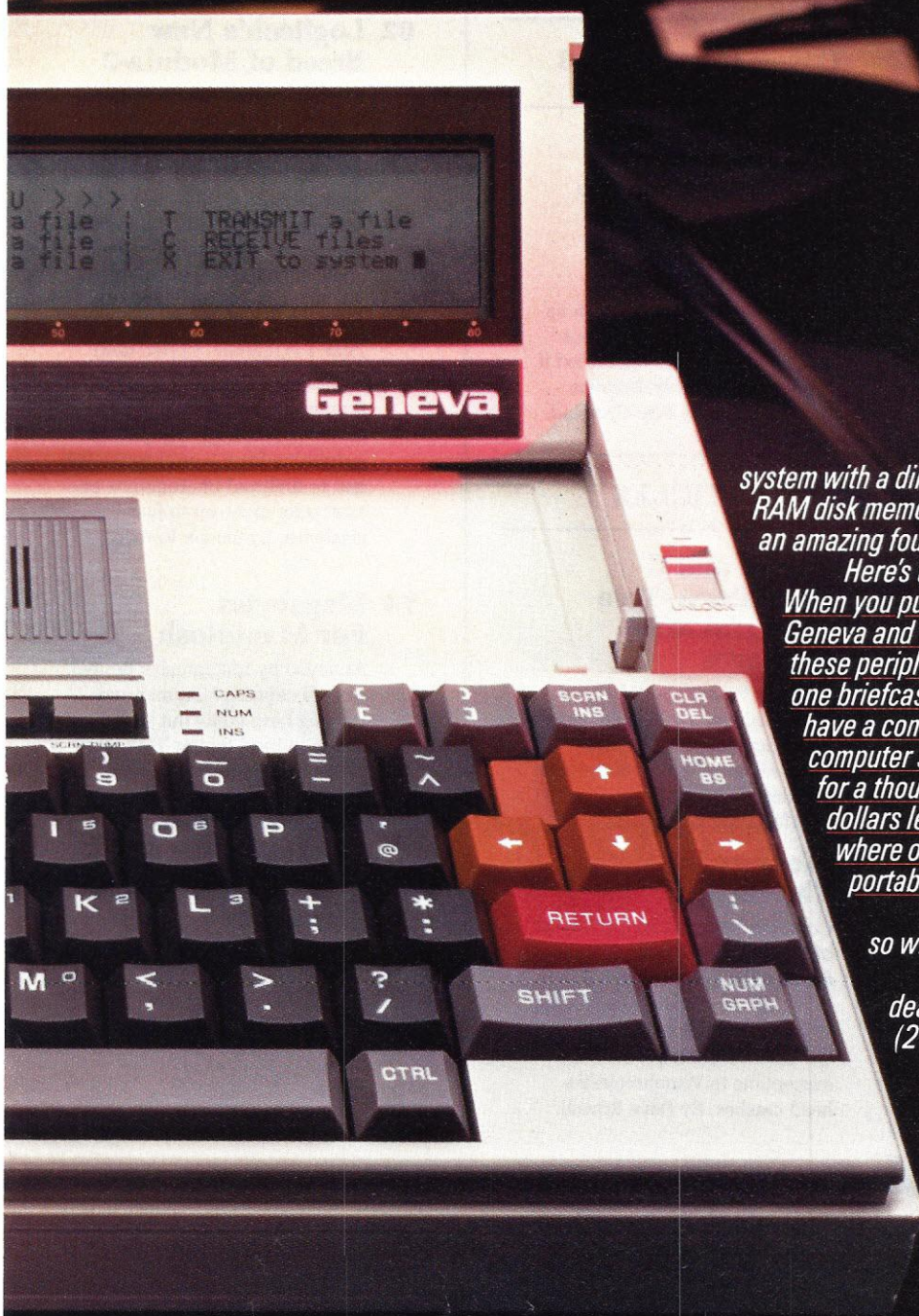
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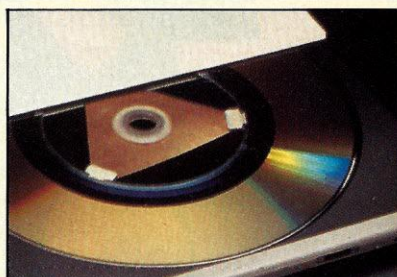
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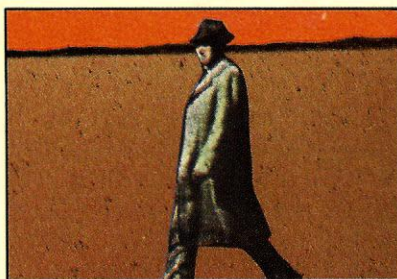
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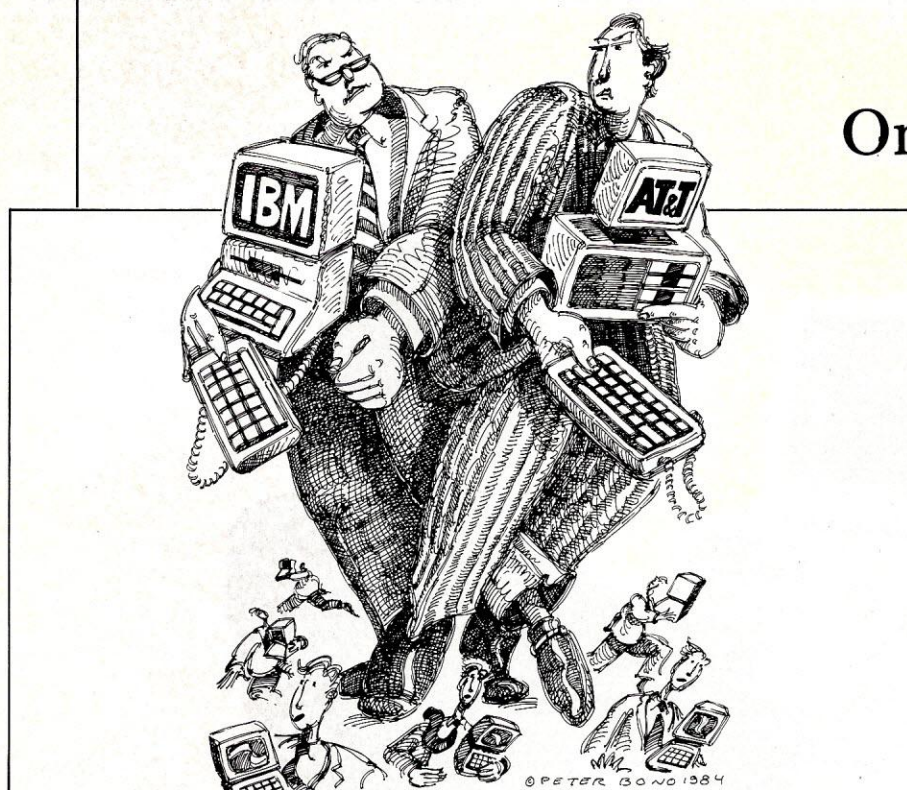


# The Edit Mode

By Dan Muse

## The AT&T Challenge

There's a  
New Bully  
On IBM's Block



Just what the microcomputer world needs—another multibillion-dollar corporation. AT&T, a company near and dear to your heart for its years of dedication to quality telephone service, has announced its own personal computer.

Two questions are raised by the introduction of the PC 6300: What effect will the event have on the industry as a whole? What effect will it have on IBM in particular?

### Obvious Rationale

AT&T's rationale in entering the market is obvious. It's the company that developed Unix. And if the operating system lives up to its

promise of being the OS of the 80s, then AT&T wants to be there to cash in on the success with its own micro. What better company to fully implement Unix than its developer?

It's interesting that AT&T decided to go PC compatible, rather than putting all its eggs in its Unix basket. The corporate bigwigs at AT&T are smart enough to know how crucial IBM compatibility is at this point in the game. They're also too wise to think they can suddenly pop onto the scene and make IBM disappear.

I suppose the PC 6300 should be classified a "clone-plus." It's based on the Intel 8086 and reportedly

runs about 50 percent faster than the IBM PC. The machine is MS DOS compatible and will sell for \$2895. In addition to PC compatibility, the 6300 can function as one of 18 terminals in a network with a 32-bit Unix-based minicomputer.

With MS DOS in its machine, AT&T hopes to entice you to buy now. It will try to catch up with IBM. Then, when Unix catches on, AT&T figures it will pass Big Blue, eventually leaving it in the dust.

### The Games Have Just Begun

It remains to be seen whether or not AT&T's strategy will pay off. AT&T has made itself clear, however; it plans to have its PCs around when the smoke clears.

The debut of AT&T as a big roller in the microcomputing industry craps game will produce far-reaching ramifications.

Instead of the "big three" corporations—IBM, Apple and Tandy—there are now the "big four." In terms of pure dollars, AT&T may be the biggest. Of the three, IBM is, of course, the most affected by the AT&T 6300.



**While the two giants go at it, many companies, especially PC-compatible manufacturers, will suffer from the fallout. . . . To some companies, the effects could be devastating.**

Apple has no vested interest in the MS DOS or Unix market—at least not right now. Tandy, with its network of Radio Shack Computer Centers, won't be competing on dealer's shelves with AT&T. However, the Tandy 2000 is aimed at the same general audience.

## Is IBM Surrounded?

With AT&T on the scene, IBM finds itself sandwiched between two formidable competitors. IBM has been competing with Apple in two ways: indirectly for the prestige of being the unofficial leader in the micro world and directly in the Junior vs Ilc struggle for the home market. Enter AT&T. Now Big Blue has Apple on the left and AT&T on the right.

If Apple vs IBM is a David and Goliath-type battle, then IBM and AT&T are like King Kong and Godzilla. AT&T has made its initial move and now IBM is poised to retaliate. In fact, it made its counterattack before the 6300 introduction, cutting prices on the PC by 20 percent.

Big Blue wasn't caught flat-footed by AT&T. In fact, IBM may be a step ahead of AT&T. Rumors of the new PC to be introduced next fall are hot and heavy. Gossips seem to agree that the new system will be based on the Intel 80286 and will be multitasking version of the PC.

AT&T is eager to challenge Big Blue in its strong suit (corporate sales). IBM, figuring a good offense is the best defense, is going after the market that has kept the AT&T bread buttered—communications.

The new PC (along with a new operating system with multi-user

functions should address the challenge that AT&T will present when its Unix-based personal computers are introduced. IBM is apparently ready, willing and able to battle on AT&T's turf.

## The Rumor Mill

The California Technology Stock Letter (issue No. 63) reports that IBM has three operating systems under development. All three are windowing systems that can run guest operating systems.

One OS will be a stand-alone system. The second is a multi-user system and a third, and last to reach us, will be a Unix-like system, the California newsletter reports.

The new operating systems will offer more power for programmers, and since each system will also run guest OSs (i.e., PC DOS), MS DOS programs won't become obsolete.

## What about the Little Guy?

While the two giants go at it, many companies, especially PC-compatible manufacturers, will suffer from the fallout. When IBM slashed its prices in response to AT&T, the leading clone-makers were forced to match or beat the PC price cut. To some companies, the effects of the lost revenue could be devastating.

Microcomputing contributing editor Frank Derfler likes to refer to IBM as the grizzly bear and AT&T as the polar bear. Staying with that analogy, I'd say the two really aren't fighting yet, but rather are pawing each other.

The question, though, isn't which bear will win the fight, but whether or not they'll crush the smaller animals in the heat of battle.□

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# Letters

## Address Unknown

Of the several reviews of the NEC PC-8201 that I've read, Ray Albrektson's (*Microcomputing*, June, 1984) was by far the most informative. Even after using the PC-8201 for six months, I learned things from Ray's review.

Like Ray, I wanted to find out the I/O port addresses used by the PC-8201. Fortunately, when I called NEC in Elk Grove, IL, to get this information, they were more helpful than the technical representative that Ray talked to in Singapore. Rather than telling me that this information was "very secret," the distributor told me about two technical documents that are available. These are the *PC-8201 Service Manual* and a software technical manual titled *PC-8201 Technical Notes*.

The service manual is a nicely printed document that comes in a good quality stand-up loose-leaf notebook. It gives a useful technical overview of the machine (including I/O port addresses), troubleshooting flowcharts and procedures, parts list and schematics. It also comes with a moderately heavy price tag: \$50.95 (shipment prepaid).

The software manual includes a hardware section that looks like a draft manuscript of the Functional Specifications chapter of the service manual. This has just about all the hardware-specific information that a programmer would want. The rest of the manual (about a pound) is devoted to the ROM routines.

Unfortunately, the entire manual looks like it was made with a not-too-good office copy machine. About a third of it was originally listed on the kind of forms paper that has alternate green and white lines. This is anything but an aid to the reader! Price: \$20 plus \$1.75 shipping.

Judging from the grammar and syntax in both manuals, it's obvious that they were translated from Japanese.

I gather that both manuals can only be ordered directly from NEC (1401 Estes Ave., Elk Grove, IL 60007). Interestingly, they have to be ordered from different departments, the service manual from the Parts Department and the software technical manual from Computer Sales Administration.

Though we fault the inadequacies of the user documentation that is supplied with the PC-8201, it's certainly better than that supplied by many companies. Before I knew that technical manuals for the PC-8201 were available, I'd gotten enough information from the user's manuals to interface a memory-mapped data acquisition system to the PC-8201 through the RAM cartridge slot.

Don Ellis  
Boulder, CO

## A Command Performance

I recently read Phil Hughes' column "The Unix Shell Game" (July *Microcomputing*, p.34). It was interesting. You encouraged people to write to you with problems. Well, I have a problem with `:z (cr)` followed immediately by a `:x (cr)`. Sometimes I lose data in my files, sometimes I lose complete files and other times nothing is lost. If I catch myself and do a `z.`, what was lost reappears.

When I do a `:z :x`, a message appears at the bottom of the screen at EOF and the cursor appears at the top of the file at about column 45.

I have tried these commands on two different systems: the Cyb and the Codata. They have the same version of Unix with different revisions.

The above commands are being done while in the vi editor.

Debra Mattson  
Phoenix, AZ

Reply:

Debra, thank you for your letter regarding my column. I tried the command sequence you described

on my Codata and was unable to reproduce the problem. Vi uses the Berkeley termcap package. It's possible that the problem is in termcap. I ran the tests with an H19 terminal. If you are using a different type of terminal, this could explain why it fails for you and not me. If you have access to a different terminal type, it might be worthwhile to try it.

Phil Hughes  
Seattle, WA

## Unix Utilities

I would like to know if the following utilities are part of the Unix standard utility programs.

- Sales order processing/accounts receivable
- Inventory
- Accounts payable
- General ledger
- Payroll
- Job cost
- Sales analysis, recording

I'm developing a multi-user, multitasking system for 35 terminal users in nine locations. This system needs to allow for 25–30 percent growth in the future. The only "given" we have in this project is Unix software. I had never even heard of Unix before this project. Your column in *Microcomputing* has been almost the sole source for my Unix research.

I would like to know what hardware is compatible with Unix software and what controls and security are resident in the operating system. Does it have a database management system? Also, what type of data communications are necessary to link nine intelligent terminals?

Jean S. Piper  
Glendale, AZ

Reply:

Thanks for your letter. The utilities that come with Unix are better called tools. They are programs to assist you in manipulating data and files. An example is `awk`, a powerful



## Letters

pattern matching and reporting language. You could use it as the report generator portion of an applications system such as order processing (I do) but there is nothing supplied with Unix that is a complete applications package.

All of the packages that you're interested in are available from numerous vendors. There are also about 100 hardware vendors with systems capable of running Unix. There is an international Unix group, /usr/group, that publishes a Unix products catalog. This is an excellent source of leads for what you are looking for. The catalog is \$50 for nonmembers but is included free with a membership that is also \$50. They can be contacted at:

/usr/group  
PO Box 8570  
Stanford, CA 94305

My September column addressed file system security. There is also a short paper entitled On the Security of UNIX by Dennis M. Ritchie that is included with the documentation that comes with a Unix system.

I hope this points you in the right direction. There is a lot of information out there. I think you will find that you need to pin down your requirements and then just go shopping. Good luck.

Phil Hughes  
Seattle, WA

### New Horizons

This letter is in response to Steve Marmun's letter that was published in the July 1984 issue of Microcomputing (p. 12).

There is an easier way, but Steve went only halfway in his explanation. His explanation may well work on an Epson MX-80 but with an FX-80 printer connected to a North Star Horizon computer you must also (in addition to the wiring tables presented in Steve's letter) make a minor change in North Star's DOS.

To make all eight bits available to the printer, so that graphics are available, you must also NOP out 11 bytes in the DOS. A detailed ex-

planation (simple enough for a novice to use) of how this is accomplished may be found below.

This procedure is presented exactly as I did it for a friend of mine two days ago. I can't guarantee that it will work on all North Star Horizons.

The procedure below is for North Star's DOS 5.2. For others, add one additional item; let's call it "3a."

3a. LF DOS 2100 and look for the same sequence that is listed in item 4. That is, DA 2100, 4000.

Now look for the exact sequence that is found in item 4—F6 80 D3 00 EE 80 D3 00 D3 00 E6 7F. When this is located, proceed to step 4; substitute the address where the sequence was found for the address that is given in step 4. Complete the changes in step 4; then complete the remaining steps.

1. First you must be in the DOS mode, indicated by the + sign.
2. LF DOS 2100 and get the + sign again.
3. GO M1000 and get a > sign.
4. DS 29B4

F6 = (type in a 0 then press the space bar)

80 = type 0 then press the space bar

D3 = press the space bar

00 = press the space bar

EE = type 0 then press the space bar

80 = type 0, press the space bar

D3 = type 0, press the space bar

00 = press the space bar

D3 = type 0, press the space bar

00 = press the space bar

E6 = type 0, press the space bar

7F = type 0, press the <CR> key

5. Type OS (to return to the DOS mode).

6. Then type SF DOS 2100 (this saves the DOS file that you just modified).

I hope that the above explanation helps people trying to get eight-bit graphics out of their North Star Horizons.

Ed Yarga  
South Gate, CA

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# Overview

By Frank J. Derfler, Jr.

## School Daze— Micros in the Classroom

### Tapping into Computer Power: Practice vs Theory

This month, I'm going to take a look at the maneuvering between AT&T and IBM.

But first, on a more philosophical note, I'd like to relate my views on the role of the computer in American public education. I recently addressed several groups of educators on this subject and I think it's time to air some ideas and issues.

#### The Micro in School

Public schools in the United States responded to the microcomputer revolution in interesting ways. At first, many school leaders hid their heads in fear. Administrators were afraid that computers would disrupt their schools, and teachers were afraid that computers would take their jobs.

These reactionary positions were a replay of what I saw as a teacher in 1971 when the first four-function pocket calculators came on the market. The schools in my district prohibited students from using these devices because: 1) The new ma-

chines were a novelty and therefore "disruptive." 2) Students didn't "learn" from using calculators.

3) The use of calculators was "unfair" because some students could afford them and others could not. I considered these arguments utterly wrong, but since I was teaching speech and English at the time, there wasn't much I could do to fight the "experts."

#### Expert Opinion

Now, however, as experts go, "I am one," so I would like to see if I can moderate the swing of the microcomputer pendulum before it goes too far in the other direction. Within the last two years, the doors of the schoolhouse have been blasted open by persons demanding that Johnnie and Susie be taught how to "compute."

Today's newspapers often publish lists comparing the computer-per-pupil ratio of local and regional school districts. The math departments of intermediate and senior high schools have been charged with teaching the finer points of flip

flops, binary logic and programming. Seventh and eighth grade students are writing Basic programs, and high school seniors are planning careers as computer programmers and operators. As usual, the demand for a public institution to react has resulted in over-response.

One way to gauge what public schools should be doing with computers is to compare the technology of computing with another technology we know well. Think of the microprocessor as a source of power, like the internal combustion engine. The most common, but certainly not the only, device that harnesses the power of the internal combustion engine is the automobile. The most common device used to harness the microprocessor is the microcomputer. Both the automobile and the microcomputer, in their own time, became practical applications of a particular new technology with the ability to substantially change the way people live and do business.

The schools responded to the automobile by starting courses in metal shop and automotive repair. The schools responded to the microcom-



puter by starting courses in programming and computer theory. But auto shop (setup and repair) soon became a secondary elective, while courses in driver education (using the technology) became important in every school. Most people have to know how to drive vehicles; far fewer have to know how to design or repair them. If you teach students the elements of driving, their skills can be applied to different kinds of cars and trucks. If you give them the experience of using a microcomputer, they can apply that to many kinds of automated systems.

### Not Auto Shop

We shouldn't teach our public school students about computers in the same way we teach auto shop. People don't need computer theory to use a microcomputer any more than they need to know the theory of the internal combustion engine to drive a car. If we persist in introducing computers by teaching Basic programming and digital theory, we'll be leading many students in the wrong direction.

We need to start now to provide practical hands-on experience in computer systems that matches driver's training. We need to teach people how to use a computer as a tool to do their work—little more and no less. Computer programming and repair will be careers for only a limited number of people, but the majority of students in high school today will use computers as living tools after graduation. We need to introduce computers into our schools in that way.

I don't favor teaching Basic and calling it computer literacy, but I do favor using word processors, spreadsheets and graphics software in humanities, science and art courses. Computers are tools, not the end item of study for most students. This approach means we have to buy a lot more machines capable of doing word processing and running spreadsheets and get them out of the math department and into libraries, study halls and classrooms.

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## People don't need computer theory to use a micro any more than they need to know the theory of the internal combustion engine to drive a car.

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This sounds costly, but it doesn't have to be. The big manufacturers are falling over themselves to put microcomputers into schools at discount prices. In addition, the potential for equipment donations from local companies and individuals is growing as 16-bit systems replace eight-bit technology. An eight-bit CP/M system can run WordStar and SuperCalc just fine. TRS-80 Model IIIs, which seem to have little resale value, still have great classroom utility. Not everyone needs a PC or a Macintosh. We need more microcomputers in the public schools so we can develop more drivers—and some mechanics.

Now, I'll put away my soapbox and move to the battle of the beasts.

### Growls and Snarls

It seems that the AT&T polar bear is now serious about hunting in the IBM grizzly bear's range. But the grizzly isn't asleep. The introduction of AT&T's PC-compatible microcomputer was met by a fierce charge and a growl from IBM.

It's interesting to compare eras. When IBM entered the microcomputer market, Apple Computer took out large newspaper ads welcoming

IBM. The two companies then proceeded to ignore each other. When AT&T entered the micro market, IBM's act of welcome was to cut the price of the PC by more than 20 percent only two days before AT&T's announcement. Since advance word was that the AT&T micro was priced about ten percent below IBM's old prices, the welcoming "gift" from IBM served notice that micro marketing is now a tooth and claw business. The price cut was a fierce charge toward a new competitor on the range. The growl was the announcement of two new high-end graphics versions of the IBM 3270-PC.

In case you missed the announcements, I'll quickly run through the features of the new AT&T and IBM systems. But keep in mind that I don't believe the PC clone was the really important product released by AT&T. Another product announced at the same time may catch the grizzly in a snare yet.

### The AT&T Micro

If you're going to market a microcomputer to compete with the IBM PC, you have to have a product that's a little better or at least a little different than what IBM provides. Some companies relied on price to win sales, but IBM has challenged this position quite successfully. I visited the IBM PC assembly line in Boca Raton, and I don't see how anyone could put a large volume of machines together more efficiently.

On the surface, it appears that AT&T is going for speed. The AT&T PC 6300 uses an 8086 processor and a bus structure that allows full 16-bit parallel addressing. The present machine can run all PC applications that don't require color graphics (not all of 1-2-3 or Flight Simulator). It's a nice-looking machine that's being marketed through major computer store chains. It's fast, but if rumors are right, the speed advantage over the PC won't last long. The AT&T PC will have to be more than quick to survive on IBM's range. I think it is.

IBM's announcements brought



two new products into the top of the PC line. These products were needed, but coincidentally, they also compete with a graphics terminal announced by AT&T along with its 3B2 computer. The IBM 3270-PC/G and GX provide dense graphics displays in multiple windows. They can also reproduce these displays on a relatively low-cost ink jet printer. The 3270-PC/G and GX are designed so that they receive graphics images from the main-frame computer in a condensed format. The images can then be modified on the local 3270-PC using special software. Depending on the configuration, these machines cost between \$9000 and \$16,000 each, but that's still under the price of many graphics display terminals that don't have the 3270-PC's internal processing capability.

Certainly, these graphics machines are products that IBM needed to have in its product line, but the timing of its announcement made them appear to be a growl in AT&T's direction. Not that IBM is alone in playing psychological games. You've almost certainly seen the AT&T ads featuring the name "Watson." The usual theme is, "Watson, you should see us now!" You also have almost certainly assumed that they were referring to Alexander Graham Bell's assistant. But if you work for IBM or know the history of that company, then you know that the two most prominent men in IBM's origins were Thomas J. Watson, Senior and Junior. They founded and ran IBM and the shadow of Watson, Senior, still looms large in the IBM corporate mind. But certainly AT&T's ads refer to the guy who cleaned up the acid for fumble fingered Alex... don't they?

### Move and Countermove

The area that AT&T may use to snare the old grizzly is the major strength of AT&T: communications. AT&T announced several products that allow PCs to work together. This philosophy is so important that one of the first optional software

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## AT&T's move to fully integrate low-cost microcomputers into communications puts a pincer on IBM. But wait—the grizzly is serious about this fight.

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packages released for the AT&T 6300 gives the computer the ability to switch back and forth between communications and a local application. The AT&T computer communications products include one that IBM doesn't have: a local area network. AT&T's local network is called the Information System Network, or ISN. This is a broadband network using packet-switching technology (like Tymnet or Telenet) that has the ability to work with many different communications protocols, including IBM's System Network Architecture. In addition, AT&T introduced its 3B2 super mini with the ability to host up to 18 AT&T 6300s or IBM PCs. This sharing scheme includes the ability to translate data files between the Unix operating system used by the 3B2 and MS DOS used on the PC.

This ability to share and communicate could place AT&T ahead of IBM in the area of corporate sales. Most corporate users quickly find a need to communicate with the corporate database or to share files and peripherals with other PCs. This aggressive move by AT&T to fully integrate low-cost microcomputers into communications systems put a pincer on IBM. But wait—the grizzly is serious about this fight.

If the rumors flying around as I am writing this column are correct, as you read this, IBM will already have announced its multi-user version of the PC. The rumors say this machine will use the 80286 processor, have a megabyte of memory and use a new operating system from Digital Research (the CP/M people) with multi-user functions and compatibility with MS DOS. This type of machine would hold off the AT&T PC plus 3B2 multi-user combination very nicely. It'll also be a good alternative to local area network systems. After all, a multi-user system with the right kind of software is really a local area network in a star configuration.

The next announcement you should be watching for after you read this (assuming that IBM has announced the multi-user system) should come again from AT&T. Its personal Unix machine manufactured by Convergent Technologies should fill in another piece of the corporate computing and communicating structure. Also, AT&T has to combine telephoning and computing very soon. This is its strong hand and it has to play it.

### Posturing and Positioning

These product announcements are fun to watch, but they're mainly good theater. The real work goes on when the corporate sales people start to call. The press has been down on AT&T, saying that it doesn't know how to sell because its people are either new or only experienced in a monopoly environment. There is some truth to that in the upper executive ranks, but I know that the people who have called on me from AT&T Information Systems and AT&T Technologies (the old Bell Labs) are as good as any that have ever worn IBM's corporate pinstripe uniform. If the products that have been promised can be delivered (a real weakness of AT&T Technologies right now), then the AT&T polar bear may yet make the IBM grizzly dance.

(Continued on p. 17)





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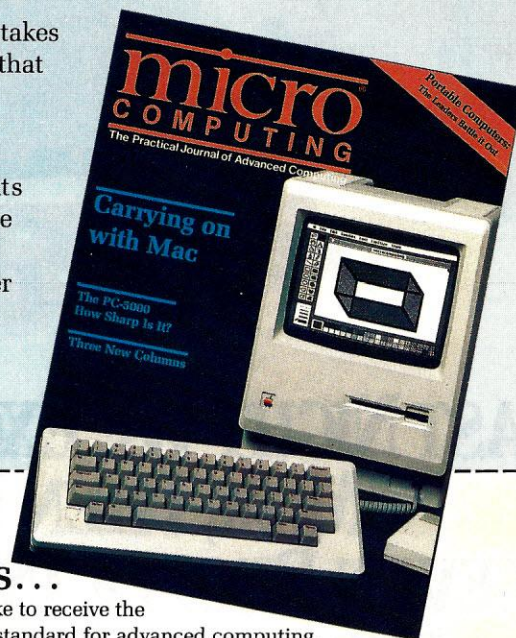
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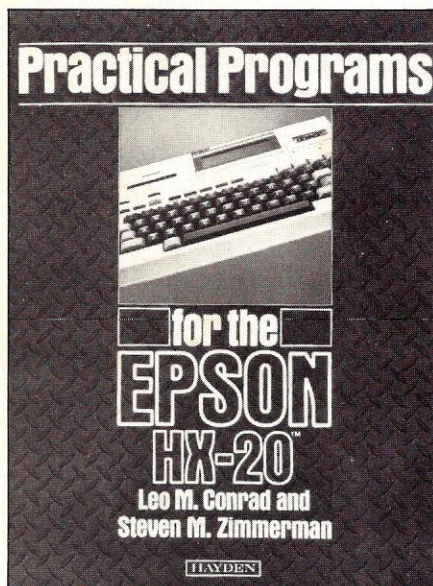
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## Good Books

I know that some of you readers are Epson HX-20 users because I got some fan mail when I praised the HX-20 over the Tandy 100 last year. You'll be pleased to know that Hayden books has released two nicely done works on the HX-20 written by Leo Conrad and Steven Zimmerman. The first is called *The User's Guide to the Epson HX-20* (ask your book store for ISBN 0-8104-2200-X) and *Practical Programs for the Epson HX-20* (ISBN 0-8104-2201-8).

The *User's Guide* has some good information on interfacing the HX-20 with printers and other microcomputers. It has a few silly parts like where it informs you that an HX-20 would have cost more than \$2 million in 1950 (so what?), and it lacks any real insight into the hardware, but the practical advice is great. (I was, by the way, once under contract to write a book on the HX-20 that focused on technical details of the hardware. I couldn't get any details, so I gave up.)

The book of practical programs has a lot of business and real estate programs that are good and are really practical. These books sell for \$16.95, so they aren't cheap, but the *Practical Programs* book is worth the money if you want business software for your kneetopper.

While I'm handing out praise to Hayden books, I should also mention their *Fast Reference Guide* series. These guides are slim volumes of only about 40 pages each, but they provide a fast and handy "cheat sheet" for using popular software, such as WordStar, SuperCalc, dBase II, CP/M and others. Each command is given with examples.

I've used WordStar on different machines for more than seven years, but I still don't know all of the commands. The *Fast Reference Guide to WordStar* has a permanent place on top of my monitor. It's a much better guide than the reference card provided by MicroPro because of the examples it contains. I don't know if Hayden has a fast reference for MS DOS 2.1 yet, but I certainly need it. (Are you an MS DOS expert? Do you want to make a

little money? Contact Hayden Books in Hasbrouck Heights, NJ, and tell them you want to write an MS DOS handy guide.) These little books only cost \$3.95 each and they're worth it. Tell your bookstore that the ISBNs run from 0-8104-1150 through 1155.

## Stay Tuned

Things move quickly in the micro world. If you want to understand the trends and the technology, stay with us in *Microcomputing* and here in "Overview." □

Contact the author at Box 691, Herndon, VA 22079.

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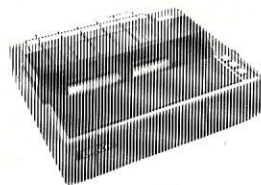
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# The Database Manager

By Shawn Bryan

## Translating the Database Jargon

### In the DB Market? What to Look for; How to Shop

Database management has created its own subset of computer patois. A function of this column should be to try to explain the jargon, to translate that patois into English. While technical language is necessary to explain technical subjects, it's important to adequately define the terms used. I'll attempt to run a short course on database argot in the next few columns. Call it the Berlitz School of Database. In a few short hours you will be speaking with the natives in their own language!

This series will, of necessity, not be a complete course. It'll cover basic topics and serve, as usual, as a buyer's guide. More advanced topics will be covered in separate columns where there is enough room to focus on specifics and get into the details.

#### Database Defined

A database is an organized collection of information. Database management implies a systematic way to store and catalog that information. Your local library is a database. A library without a system would be a

frustrating place indeed, with books shelved here and there in no order. How would you ever find what you were looking for? A database management system on a computer is like the Dewey Decimal system used by your library to catalog books. It describes a method for shelving and retrieving information on your computer.

A number of different systems can organize information on a computer. In the computer world, these systems are called models because they're not definitive. A model is a blueprint, but the final product may not look a lot like the blueprint. Some database management systems are hybrids, combining parts of several models to try to capitalize on their strengths.

What you really need to know is that there's a theoretical science of database management that has created and is creating database models. There's also a practical or applications science of database management, which takes these models and puts the theory to work in programs you purchase to do your database management chores.

While a library has one system to

follow for cataloging books, database management programmers have several models or systems that point the way. You'll hear about file management systems, relational database management systems, post-relational database management systems, networked systems and others. Each method has strengths and weaknesses—this is the important thing to remember. All of these systems have good and poor implementations. Never assume one system is better than another simply because it uses the latest technology. There will be many right and wrong programs for every job. The best program will be the one you can live with that gets the job done for you.

If you're in the market for a program for yourself or the office, the effort you put into learning the terms and theory of database management will make you a much better shopper. You'll be in a position to cut through the hype when someone tells you, "This is a fully relational database management program using a natural language processor which adheres to the 4NF conventions."



## Start Simple

Let's start with a few simple definitions appropriate to this discussion. A file is a collection of related records; a record is a collection of fields; and a field is a discrete piece of information.

A way to visualize a database is to think of a two-dimensional table, like the spreadsheet, which has rows and columns. Think of the columns as fields, the rows as records and the entire spreadsheet as a file. Each column or field defines a discrete type of information (last name, salary, date hired and so on). The same type of information is contained in that field all the way down the column. Each record consists of the related fields in one row. This gives you enough information to understand file management systems, the most basic type of database manager. (N.B. There are aficionados in the database management business who will immediately chastise me for calling a file manager a database manager. In their eyes, database management is more than just file management. However, in this column, I'll consider database management to include file management.)

## File Management System

A file management system (FMS) allows you to work on records in one file at a time. It provides a structure for the input and output of data. A low-level FMS may not allow any more than very simple data entry and reporting. A more advanced FMS may permit the merging of files or the creation of new files with subsets of the original file.

What that means is that you can extract all the names and addresses from your client database and create a separate file with just that information. The rest of the information is still in your old file, but you can now work with just the names and addresses, the information you need for a mailing list. This new file will obviously be less cumbersome to work with than the old file.

Many people view file managers as inefficient and technologically obsolete. I disagree. File managers are capable of handling most of the data storage requirements of today's businesses. Witness computer accounting systems, file managers of the first order.

A well-designed file manager can also get around the limitation of working on one file at a time by opening files in succession to create reports or new files. While not really working on more than one file at a time, the end result is a report or new file that contains information retrieved from more than one file.

The strengths of good file management systems are that they're usually fairly easy to use and less expensive than more sophisticated programs. The design of a file management system is straightforward because it mimics familiar systems, such as a 3x5 card file or a Rolodex file.

The weakness of file management systems is that they can be inflexible. Every field must be in every record, whether or not you use it 90 percent of the time or just 10 percent. The result is that an FMS may grow larger and larger as fields are added until it collapses of its own weight. An FMS may also be less efficient in creating reports when a report uses information from more than one file.

## Look Carefully

What do you look for in a file manager? First, look for a program that offers flexibility in file design. Make sure it can read and write ASCII files. Even better, look for a program that also reads and writes other common file formats (like DIF and SYLK). This will make swapping data with other programs much easier. Also, buy a program written in a language compatible with your other programs. If you buy a file manager that's written in Pascal running under the p-System, you may have trouble moving information from it into your MS DOS word processor.

Unless you're hopelessly inept with a computer, look for a program that allows you to forgo menus when you've learned enough to fly on your own. The initial attraction of most menu-driven programs (ease of use) wears off quickly when you have to fight your way through the menus to get your work done. What this means is finding a program that uses a command language.

Try to find a program that's screen-oriented if you have to do a lot of reports. A form painted on the screen is easy to relate to when you're trying to figure out what the report will look like on paper.

Find a program that's well-documented and, just as important, well-supported. Check the manual for a technical phone number. Is there an assistance line? If not, you may want to stay clear of the program. Reputable manufacturers are more than happy to help their clientele with problems.

Check the file manager's specifications. Will it support fields that are large enough for your largest pieces of information? Also make sure it will handle the file size you're contemplating. If the program only handles 35,000 records and your file has 50,000 records, it doesn't really matter how good it is otherwise. Also make sure you can make or get back-up copies for the program, and that it works with a hard disk. You may not have one now, but as the price of hard disks comes down and your database grows, you may decide you want to move up to faster and larger storage systems. You aren't going to want to chuck your old filing system for a new one when you make that swap.

## Know What You Want

Last, and most important, define what you want to do before you go shopping. Write down the fields that will be in your file and their size. Make the best effort you can to define the entire file before you buy. Then go shopping, with your list in hand, and try out the programs that seem to fill the bill for you.



Conscientious salespeople will allow you to try the software before you buy it. Try defining your file on the software you think you want to see if it works the way you want it to.

Try several comparable programs to see how different firms have implemented the same thing, and try them on the same kind of machine you'll be using. Then choose the one with which you're most comfortable.

Programs are like works of art and each will appeal to a different personality. Just because your office-mate has the latest super filer and swears by it, don't assume you'll like it, too. By all means, give it a try, but try a few others, too. Remember, you're shopping for software that you'll have to live with for some time, so make sure you can live with your decision.

That is a brief sketch of file managers and some things to think about before you go shopping. People often call and ask me, "What program should I buy?"

It's not facetious to say, "The one that's right for you." If you've done your homework, you'll have narrowed down the choices long before you go to the store. If you feel totally lost, try hiring a consultant to help you define what you want to do. While an outsider can help you clear up confusion and be a good sounding board, you try out the recommended programs. And, make sure you have a couple of recom-

mendations unless you have absolute faith in your consultant.

## Software Serving

Now for this month's serving of software. This month I review a front-end program for R:base called Clout and a three-tiered database management program called MAG/base.

### Clout

Clout is Microrim's attempt to make its R:base 4000 program more user friendly. Clout is a data query program that uses some artificial intelligence techniques to make data inquiry in plain English possible.

If you recall my earlier review of R:base, you remember that the program uses a command language to handle data inquiries. For those folks who find R:base's command language too difficult to learn, Clout offers an alternative.

The Clout program comes in two sizes. You must have at least 256KB of memory to run Clout. If you have more memory available, there is a 384KB version of Clout provided as well. This version will run significantly faster because the program overlays reside in memory, not on the disk.

Microrim has continued its excellent documentation in the Clout manual. It provides a tutorial along with an ample reference section.

Support from Microrim is excellent, making up at least in part for its recent decision to copy protect all of its software.

Clout is just a data inquiry tool. You must create your data files with R:base before you can use this program. The only data manipulation possible with Clout is the creation of derived fields when reporting (such as the sum of a column).

### Simple Procedure

The way Clout works is fairly simple. Contained in the program is a dictionary of commonly used terms. You'll also want to add terms that are specific to your applications to that dictionary. Clout remembers the language you teach it and then permits you to ask for information from your database in normal sentence style. For example, an R:base request to select attributes from a relation looks like this:

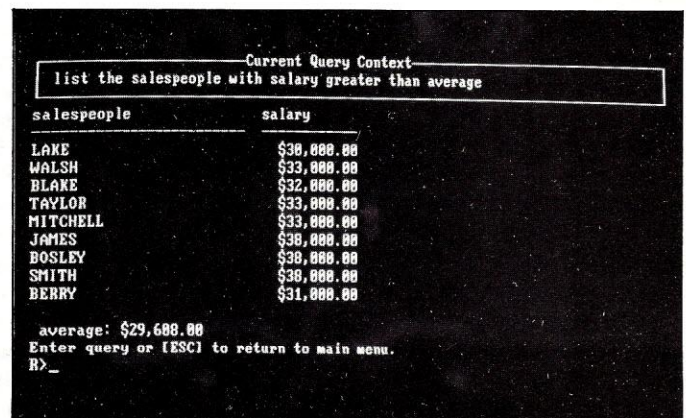
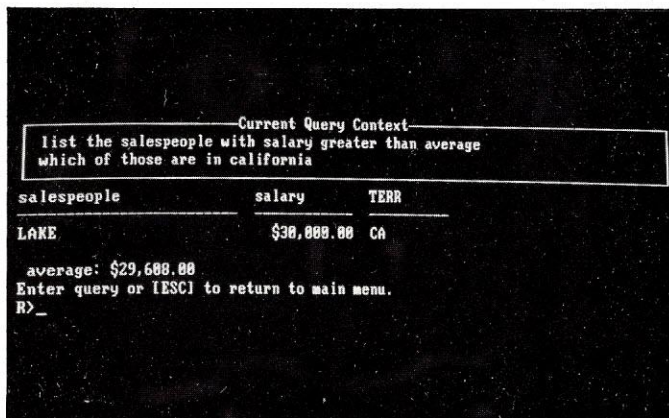
```
SELECT attname1 (attname2 attname3...)+  
FROM relname.
```

The same request in Clout reads:

List the attname.

Notice that the syntax is quite conversational. More important, however, is the way Clout reacts if it doesn't understand you. R:base is a friendly program, but when you give it a command it doesn't understand, it tells you it doesn't understand and quits. You have to start your query over. Clout, on the other

This series of screen photographs shows how a fairly simple plain English request to Clout can grow into a complicated data inquiry. Notice the forgiving nature of Clout in the third photograph where it did not understand the request and asked for a definition. Clout makes a reasonably friendly program even more so.





# The Database Manager

hand, tells you it doesn't understand and then asks you to define what it is you're trying to do. This hand-holding by the program makes data inquiry a more pleasant experience for the novice user.

## Good Supports

Clout's syntax supports algebraic notation. By using parentheses, brackets and braces, you can design requests that will perform global math calculations. If you don't know a specific value but know an approximate amount, Clout understands the word "about" and will give you a list of all values that are about the amount you've requested.

Clout also supports the relational aspects of R:base files so you can request information across several files at one time. Clout uses the logical operators (And, Or and Not) and you can ask who, when or where questions, comparison questions and conditional questions. For example, you can ask Clout, "Who has cumulative sales greater than the average and isn't in the western region?" That's no problem for Clout, but it could cause problems for less conversational programs.

Clout has room for 500 definitions in your personal dictionary, which should be sufficient for most applications. The dictionary is modified from the Clout menu. You can also use the Unload command to dump a copy of your dictionary to an ASCII file. You can then modify it with a text editor and load it back to your database. You can maintain as many separate dictionary files as you need for your application and load and unload them as needed.

Clout's standard dictionary consists of 300 commonly used database management terms.

## Copy Protected

Clout is copy protected in the same fashion as the latest version of R:base. You must place your program disk in the right-hand drive of your computer and the help file disk in the left-hand drive. You then start the program by calling Clout from the B drive. When it's finished loading, you must remove the program disk and insert your data disk. Copies of the program disk will refuse to load, so you must rely upon your original disk plus the one free backup Microrim sends you. I frankly preferred Microrim's earlier policy in which its program disk wasn't copy protected.

If you're uncomfortable with the command language used by R:base, Clout may be a good program selection. It's a tribute to Microrim that R:base is easy enough to use so that Clout is an optional, rather than a necessary, program.

## MAG/base 1, 2 and 3

Buying MAG/base is like marrying into a large family—not only do you gain a spouse but all the relatives, too. MAG/base comes in versions 1, 2 and 3 for all your database management needs.

MAG/base 1 is a file manager, providing you with a menu-driven system for keeping track of your basic data management chores. MAG/base 2 is the bigger brother and includes a relational report

writer and additional formatting and file handling options. Finally, the rich uncle is MAG/base 3. He has a complete development system at his beck and call. There are user-callable screen and data management functions, multi-level password security, and MAG/sam, a key access system that speeds up data retrieval.

Each member of the MAG/base family is compatible with the others, something many families cannot claim. Systematic file structure and syntax make going from one member of the family to another effortless.

## Settling Down

The sign-on system for MAG/base takes a little getting used to. The program isn't copy protected, but making a back-up copy involves entering the lengthy program serial number. This isn't an insurmountable problem, however, and you'll soon find yourself at the master menu. This program is menu-driven from beginning to end. You can circumvent the menus in MAG/base 3 when you get into programming, but at the 1 and 2 level, you'll be prompted through most of your actions.

MAG/base works extremely well with Basic, in part because much of it's written in Basic. MAG/base 3 is especially suited to Basic programmers because you can get into the guts of the program using calls to MAG/base. In this way, you can use MAG/base as the center of an application you're developing, saving yourself hours of programming. MAG/base can become the sorting

Current Query Context			
are there any poor performers rank them by salary			
LNAME	salary	IQTRA	IQTRP
LEE	\$25,500.00	\$243,000.00	\$250,000.00
ADAMS	\$26,500.00	\$190,000.00	\$300,000.00
ALLISON	\$27,000.00	\$174,000.00	\$200,000.00
PERKINS	\$27,000.00	\$95,000.00	\$150,000.00
CHU	\$28,700.00	\$235,000.00	\$275,000.00
LAYKIN	\$29,000.00	\$295,000.00	\$325,000.00
LAKE	\$30,000.00	\$95,000.00	\$200,000.00
BERRY	\$31,000.00	\$143,000.00	\$150,000.00
WALSH	\$33,000.00	\$143,000.00	\$200,000.00
BOSLEY	\$38,000.00	\$143,000.00	\$200,000.00
JAMES	\$38,000.00	\$176,000.00	\$200,000.00
Enter query or [ESC] to return to main menu.			
R>_			

Current Query Context	
list the salespeople with salary greater than average which of those are in california are there any poor performers	
Did not understand: poor performers Please enter a synonym or change spelling. R>salespeople with sales less than plan	
Do you want to make this a permanent definition? (Y/N).....	



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and data management facility hidden behind your programming efforts at the user interface level.

## Multi-User Processing

The latest version of MAG/base offers multi-user processing for people running concurrent CP/M-86 and MP/M-86. Multi-user support is built in, not an extra cost add-on. MAG/base uses a single-record locking system so the multiple users will normally not see any degradation in system performance. The record being used is locked out while changes are being made to it, but it can still be read, and other records in the file are still available to the rest of the system users. This is an improvement over some systems, which lock users out of the entire file when a record is being retrieved or written.

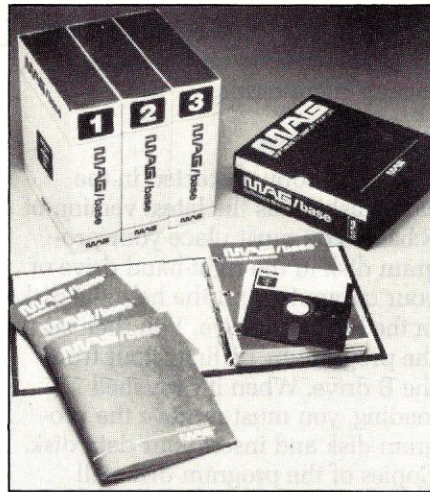
MAG/base uses dynamic join techniques during data retrieval. This method is faster than physical join techniques used by some systems for relational retrieval. The dynamic join reads only records that match the search criteria rather than the entire file, saving time on disk I/O.

## Poor Manual

The MAG/base documentation takes most of my criticism. For a program that's supposed to simplify your life, this manual may at times complicate it. The program is done well enough to overcome the manual, but I certainly hope the MAG/base people consider the impact the manual has on potential customers.

The MAG/base system comes in an IBM-sized three-ring binder boxed with a starter kit. The starter kit contains the installation manual, the desktop reference and a MAG/base primer. To install MAG/base, you make a copy of the original disk using the Diskcopy or similar command. You then make a working copy from this copy after installation on the first copy is complete. The installation guide has 13 pages of installation instructions followed by a catalog of the programs residing on each MAG/base disk.

After you've completed the instal-



*A family gathering of MAG/base software.*

lation procedures, please go through the tutorial in the MAG/base primer. It gives you a better understanding of this program's intricacies. The samples it uses are of a real estate business and show off the multiple file search capability of MAG/base. There are also fairly good explanations of the data manipulation language and report formatting language used by MAG/base.

So much for the good news. The bad news is that finding things in the reference manual can be like looking for a needle in a haystack. First, there's no index in this manual. For a reference work of several hundred pages, that's inexcusable. Secondly, the manual is broken into logical sections: General Reference Report Writer, Programming Aids and MAG/sam. The problem is, there's no single table of contents, either. If you aren't sure where you should look to find your information, you won't get much help from the manual. Most of the information you'll need is in the general reference section, but occasionally you'll have to move on to other sections to find detailed answers to your questions. MAG Software should reorganize the manual to better accommodate the system user.

Another thing I found disturbing was the inability to save keystrokes by using function keys. MAG/base has apparently decided not to implement these handy creatures so every entry has to be typed in full, includ-

ing the End command required after you complete many of the MAG/base command sequences.

## Shapes Up Well

With that out of the way, MAG/base shapes up pretty well. It's not what I'd call a novice's program. The file manager is easy to use, but MAG/base clearly has its roots in the more complex world of data management. MAG/base 2 and 3 use more complex and complicated management techniques, and the language is more complex as well.

Another holdover from mainframe days in MAG/base is the way in which the report writer handles screen design. Instead of using paint-on-the-form techniques and a straightforward query language, MAG/base uses report definition files that remind me of mainframe JCL (job control language) statements. These statements use a series of two-letter codes to describe the report format. This definition, once typed, is then compiled into an executable program. You won't find creating formal reports on the fly to be particularly pleasant or possible. About the only real benefit you have using this system is that you do achieve some flexibility that you don't have with other reporting systems, and this system is the reason the dynamic join process is possible.

## MAG/sam

The programming aids section and MAG/sam section of the manual are for programmers only—MAG/base says so in the preface to the manual. The utilities section is a programmer's toolbox that automates some of the onerous chores of system creation. Menu definition, password definition, file definition and environmental definition are all handled by programs provided by MAG. From the utilities, you also have access to the MAG/base Data Management Language, screen management functions and the file management functions. The details of MAG file structure are explained in this section so programmers can write their own applications with hooks to MAG.

Finally, the MAG/sam section covers the use of MAG/sam, which is



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multikeyed file management system used by MAG. This program, or series of programs, is available to the programmer using either Digital Research's CBasic compilers or Microsoft's Basic compiler. MAG/sam is written in Basic and can be called as a subroutine to a Basic program.

A technical exploration of MAG/sam is beyond the scope of this column, but if you're a systems developer, this should whet your appetite for more information. MAG/sam will run under a number of operating systems, including PC and MS DOS, CP/M, MP/M, CP/M-86, MP/M-86 and concurrent CP/M-86. The reference material provided with MAG/sam will be sufficient for programmers setting up systems; a tutorial file offers some experiments using MAG/sam to display its characteristics.

So there you have a glimpse of the MAG family. It's a large family and somewhat private. Getting to know them isn't as easy as it could be. But the family does have some very capable members who, if you take the time to get to know them, can be friendly in their own way. This would not be my choice of programs for the casual user, but more advanced users and program developers may want to adopt this family.

### Other News

I've received a more complete copy of Salvo from Software Automation. This program uses natural language processing techniques to make data inquiry a more pleasant task. The newest copy is still not final, but makes better use of memory (it will load the entire program into memory if you have enough) and includes some commands left out of the original copy I received. I'll let you know how it looks in its latest iteration next month.

I'm completing my work on TIM and will have a report shortly, but I'm even more interested in Innovative Software's latest release of a Smart Series of software that has drawn some rave reviews. I'll be receiving it soon and giving it the once over. Innovative's current offering, TIM IV, is a menu-driven business person's database manager. The new series goes several steps

beyond Tim IV and makes full use of the 16-bit machines now available. Tim was born in the days of eight-bits and doesn't make use of much of the power of the new machines.

Guess that's enough to keep me busy.□

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### Products Reviewed

Clout (\$195)  
Microrim Inc.  
1750 112 NE St. A 200  
Bellevue, WA 98004

MAG/base 1 (\$295)  
MAG/base 2 (\$495)  
MAG/base 3 (\$795)  
MAG Software Inc.  
21054 Sherman Way #305  
Canoga Park, CA 91303

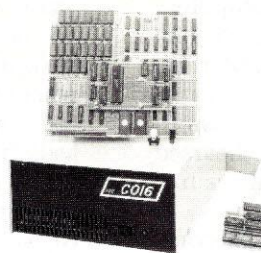
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Intersystem, Televideo 802,  
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# A> The System Prompt

By Edward Joyce

## Stuck in the CP/M Twilight Zone?

### Q & A For the Lost and Distraught

You sit down at your computer console to embark on a journey into the cosmos of computing. Start the Z80 engine, accelerate the disks to warp speed and off you go. As your fingers tap out well-rehearsed commands to the artificial brain controlled by CP/M, the micro spaceship responds in milliseconds. Gingerly, it glides through the vast volumes of ASCII text, across the endless grids of spreadsheets and above the stark plains of binary code.

#### Twilight Zone

Then it happens. Without warning, you reach a dead end while using the start/quit options of a file copy under the PIP command. The manual spells out the precise procedure, but your best efforts fail. You put on your debugging cap and begin to scrutinize the files. The investigation turns up no leads.

Suddenly, you hear the staggered chords of a familiar musical theme—you've just entered CP/M's Twilight Zone.

If you're one of the 1.1 million users whose computers think in terms of CP/M-80, chances are

you've encountered such a situation. For no apparent reason, you somehow cross a boundary in CP/M where the rules of three-dimensional space no longer apply. You feel unjustly victimized—but take heart, you're not alone. Your misfortune has been shared by legions of other CP/M users.

#### The Search for Answers

The distraught passengers who have taken unexpected side trips in CP/M eventually return firing questions. Namely, they want to know what the hell is going on. As a service to fellow victims and potential victims, I've compiled information on these pitfalls. The good news is that there are answers—in most cases, concrete solutions that'll keep your spaceship on the straight and narrow path while navigating the corridors of computerdom.

These questions and answers apply to CP/M-80 version 2.2. The resolutions cited in most cases involve applying a patch with the Dynamic Debugging Tool (DDT) utility program. The patches were taken directly from technical material supplied by Digital Research Inc. (special

thanks to Joe Byrd and Dave Grable of DRI).

**Question:** I try to write to the disk in drive A, but CP/M aborts the operation and issues the error message "Bdos Err On A: R/O." The message indicates that CP/M regards the disk as read only, but the media isn't write protected and the drive status in the Stat utility has not been set to read only. Should I take this personally?

**Answer:** When first accessing a new disk, CP/M reads the file directory on the disk and stores it in RAM. If an attempt is made to write to the disk, the operating system verifies that the directory in RAM matches the directory on the disk in the drive. If they don't match, it assumes that the disk has been switched. To avoid possible destruction to the data on the new disk by manipulating it through an incorrect directory, CP/M declares it as read only and issues an error message.

The key to circumventing this problem is to always type Control-C whenever a new disk is inserted in the drive. Control-C resets the disk



directories in RAM. Some applications programs, such as WordStar, perform this internally. For example, if you log in a new disk while working within WordStar, an automatic reset is performed and typing Control-C is unnecessary.

There's no way to remedy this problem other than being cognizant of it. Certainly, the text of the message is misleading, and until you learn its real meaning, it's guaranteed to raise your frustration index a point or two.

**Question:** The PIP utility program issues the message "disk write error," but the disk formats correctly and diagnostic programs indicate no media or drive errors. Should I try PIP later when my horoscope reads better?

**Answer:** Forget the horoscope and chalk this up as another case of a misleading error message pointing you in the wrong direction. The error message appears during a file copy. PIP is really saying that the destination disk has no room. The space crunch is caused by inadequate disk space or insufficient directory entries.

You can correct the problem by simply erasing files on the destination disk or by using a different disk with more space. Regarding the message itself, there's nothing to do but mentally convert PIP's "disk write error" to "disk full error."

Incidentally, if an actual error on the disk media or drive hardware is encountered, it's trapped by the Basic Disk Operating System (BDOS), CP/M's disk management module, and the message "Bdos Err on A: Bad Sector" (where A: represents the drive code) is displayed.

**Question:** The assembler, ASM, generates a phase error, but the source code is syntactically correct. Why is it picking on me?

**Answer:** ASM occasionally goes haywire when an identifier in a Set statement appears within an expres-

sion from another statement. Listing 1 shows the hard copy of a terminal session that demonstrates the ASM bug and how it can be corrected.

When the assembler processes the trivial three-line program at the top of Listing 1, an incorrect phase error message is generated as depicted. The bottom half of Listing 1 gives the DDT instructions for fixing the bug. After making the patches, don't forget to save the modified code.

**Question:** Why does PIP intermittently fail when I use the start and quit string options?

**Answer:** This is one of those "now you see me, now you don't"-type bugs. It thrives in only special climates and locales. Specifically, the bug rears its head when the start and quit strings are the same length.

To put this question in perspective, let's briefly examine what the string options do when they function properly. The start and quit options are two of 19 possible parameters that control PIP's execution. They define beginning and ending character strings from which file copying is to start and quit. Most users employ them for extracting a section of text from a larger file.

When the strings are the same length, for example, a start string of "Donna" and a quit string of "Marty," then PIP gets smitten by the bug. The program gears up and creates much fanfare like it's doing the job, but the resulting output file contains only one word, the start string.

Listing 2 shows how to squash this bug in its tracks with the DDT utility. It's amazing what a difference a few instructions make!

**Question:** I've applied the patch described in the last answer, but PIP still fails while using the start and quit strings. Does this bug have nine lives?

**Answer:** If you're having trouble with these options after applying the patch, you may be trying to

enter lowercase parameters on the command line. Remember that the Console Command Processor (CCP) converts all command line parameters to uppercase before they're passed on to the program being executed.

Thus, "Pip Out.txt = In.txt [SDonnaZQMartyZ]" internally becomes "PIP OUT.TXT = IN.TXT [SDONNAZQMARTYZ]."

Lowercase strings can be entered by selecting PIP's multiple file

```
A>TYPE PHASERR.ASM
X      SET      1
Y      EQU      X
      END

A>
A>ASM PHASERR
CP/M ASSEMBLER - VER 2.0
P010C =          Y          EQU    X
0000
000H USE FACTOR
END OF ASSEMBLY

A>
A>DDT ASM.COM
DDT VERS 2.2
NEXT PC
2100 0100
-L1DAD,1DB2
    1DAD CALL 1352
    1DB0 CPI 05
    1DB2 CNZ
-A1DAD
1DAD CALL 1B8D
1DB0 .
-L1B8D,1B94
1B8D NOP
1B8E NOP
1B8F NOP
1B90 NOP
1B91 NOP
1B92 NOP
1B93 NOP
1B94 NOP
1B95
-A1B8D
1B8D CALL 1352
1B90 ORA A
1B91 JZ 1DB5
1B94 RET
1B95 .
-GO

A>
A>
A>SAVE 32 ASM.COM
A>
```

Listing 1. This terminal log demonstrates an incorrect phrase error generated by the assembler. The DDT sequence mends the faulty logic.



```
A>DDT PIP.COM
DDT VERS 2.2
NEXT PC
1E00 0100
-L1168,1179
1168 LDA 1F62
116B STA 1DF7
116E LXI H,1F62
1171 MVI M,00
1173 LDA 1DF9
1176 INR A
1177 STA 1DF8
117A
-A1168
1168 LXI H,1F62
116B MOV A,M
116C STA 1DF7
116F MVI M,0
1171 LXI H,1DF9
1174 MOV A,M
1175 MVI M,0
1177 INR A
1178 DCX H
1179 MOV M,A
117A
-GO

A>
A>SAVE 29 PIP.COM
A>
```

Listing 2. Making these changes in PIP corrects a bug that causes the start and quit options to fail when the start and quit strings are of the same length.

```
A>DDT PIP.COM
DDT VERS 2.2
NEXT PC
1E00 0100
-L54F,556
054F CPI 00
0551 JNZ 055E
0554 LHL D1DFC
0557
-A54F
054F CPI 2
0551 JNC 55E
0554
-GO

A>
A>SAVE 29 PIP.COM
A>
```

Listing 3. This procedure demonstrates how PIP can be modified to accept a period, in addition to a carriage return, as an exit symbol.

```
A>DDT PIP.COM
DDT VERS 2.2
NEXT PC
1E00 0100
-L713,719
0713 LDA 1F5E
0716 LXI H,1E04
0719 ORA M
071A
-A713
0713 LDA 1E04
0716 LXI H,1F5E
0719
-L1099,109C
1099 LDA 1E04
109C RAR
109D
-A1099
1099 LDA 1F5E
109C
-L1640,1643
1640 LDA 1E04
1643 RAR
1644
-A1640
1640 LDA 1F5E
1643
-GO

A>
A>SAVE 29 PIP.COM
A>
```

Listing 4. The above modifications remedy a bug that truncates PIP copies of object files.

mode. In other words, invoke PIP first and then type the string parameters when the \* prompt appears.

**Question:** How can I execute multiple PIP commands from a Submit file when Submit does not accept PIP's exit command, namely, an empty line with a carriage return?

**Answer:** It's true that the Submit utility doesn't accept lines with only a carriage return. To circumvent this restriction, PIP can be modified to accept a period in addition to a carriage return as the exit command. Listing 3 demonstrates the DDT procedure for accomplishing this, which involves changing two instructions.

After these modifications are made, you can use a period to exit from PIP in multiple file mode. In a Submit file, place a single period on a line by itself after the last PIP command to be executed.

**Question:** PIP truncates my object files even when it's not Friday, the 13th. Is my system haunted?

**Answer:** Erroneous truncation sometimes occurs when copying object files (.COM files) with the object file transfer option (O). Listing 4 shows the DDT procedure for fixing this bug with a patch.

Personally, I've never encountered this particular gremlin. As a matter of fact, I don't even use the "O" option. I always copy object files without any command line parameters. Rather than press my luck, however, I did apply the patch—no point in leaving the door open to disaster.

**Question:** How can I run the Submit utility from drives other than A?

**Answer:** When Submit is run, it creates a temporary file of batch commands called \$\$\$SUB on the currently logged disk. The CCP then looks for this file, but it always looks on drive A. If the logged disk is other than A, then the file won't be found and batch file processing is terminated.

DRI claims that termination is accompanied by the message "\$\$\$SUB file not found." On my

machine, the system simply rebooted without an error message. In either case, processing is abruptly terminated.

The patch in Listing 5 shows how one byte of the Submit command can be changed to alleviate this problem. After the patch, the \$\$\$SUB file will always be placed on drive A, where the CCP expects it to be.

Notice that drive A, which also corresponds to the booted drive, still needs to be on-line for Submit to work. The solution outlined here just adds more flexibility—you can run .SUB files from drives other than A.

**Question:** The manual says that Submit accepts control characters, but in my CP/M system, it seems to choke on them. Is that statement in the manual an April Fool's joke?

**Answer:** According to DRI's CP/M manual, the up-arrow symbol (↑) may precede an alphabetic character X to produce a single Control-X character. In actual practice, this



```
A>DDT SUBMIT.COM
DDT VERS 2.2
NEXT PC
0600 0100
-D5BB,5D0
05BB 00 24 24 24 20 .$$$
05C0 20 20 20 20 53 55 42 00 00 00 1A 1A 1A 1A 1A 1A SUB.....
05D0 1A .
-S5BB
05BB 00 1
05BC 24 .
-GO

A>
A>SAVE 5 SUBMIT.COM
A>
```

Listing 5. Applying the patches shown permits Submit files to be executed from drives other than A.

```
A>DDT SUBMIT.COM
DDT VERS 2.2
NEXT PC
0600 0100
-L441,446
0441 SUI 61
0443 STA 0E7D
0446 MOV C,A
0447
-S442
0442 61 41
0443 32 .
-GO

A>
A>SAVE 5 SUBMIT.COM
A>
```

Listing 6. This modification allows Submit to recognize Control-Z characters in .SUB files.

doesn't seem to pan out most of the time.

DRI publishes a one-byte patch, given in Listing 6, that allows Submit to accept certain control characters in .SUB files. It will allow Submit to recognize  $\uparrow$ Z (Control-Z) as a string delimiter while editing a file and  $\uparrow$ C (Control-C) as an exit character for PIP.

Although this patch appears to work in the exact circumstances described, it doesn't seem to go much further. For example, I tried to use Control-Z as a string delimiter on a PIP command line within a Submit file. Either PIP or Submit failed to understand it, and, consequently, PIP bombed out.

**Question:** Can I nest Submit files?

**Answer:** Submit files can be nested but control returns to CP/M instead of to the original Submit. Returning control to the original Submit file requires a two-step patch.

First, edit the source file shown in Listing 7 under the filename SUBPATCH.ASM and assemble it. Next, use DDT to insert the machine code, SUBPATCH.HEX, into SUBMIT.COM, as demonstrated in Listing 8.

After this two-step patch, control

```
; Submit patch for CP/M-80, version 2.2.
;
05BB = SUBFCB: EQU 5BBH
0005 = BDOS: EQU 5
0211 = OPEN: EQU 211h
;
022D ORG 22DH ; submit erase routine
;
022D 3ACA05 OPS1: LDA SUBFCB+15 ; file open ok if
0230 17 RAL ; ext not full
0231 D0 RNC
0232 21C705 LXI H,SUBFCB+12 ; try next extent
0235 34 INR M
0236 11BB05 OPS: LXI D,SUBFCB ; open extent
0239 C35D02 JMP CREATE
;
025D ORG 25DH ; submit create routine
025D CD1102 CREATE: CALL OPEN
0260 3C INR A
0261 C22D02 OPS1: JNZ ; loop if open ok
0264 11BB05 LXI D,SUBFCB
0267 0E16 MVI C,22
0269 CD0500 CALL BDOS
026C C601 ADI 1
026E C9 RET
;
; The following code calls the preceding routines.
;
04FE ORG 4FEH
;
04FE CD3602 CALL OPS ; open the $$$SUB file
0501 DA1705 JC 517H ; jump if not opened ok
0504 3ACA05 LDA SUBFCB+15 ; set current record
0507 32DB05 STA SUBFCB+32 ; to end
050A C31D05 JMP 51DH ; jump if open ok
;
05BB ORG SUBFCB ; force $$$SUB
05BB 01 DB 1 ; file to drive A
;
05BC END
```

Listing 7. When inserted into the Submit utility, this assembler code causes a nested Submit file to return control to the original Submit instead of to CP/M.



returns to the original Submit file following execution of embedded Submit files.

## Always, Always

That covers the ten most frequently asked questions about CP/M. Of the seven that involve patches, the first commandment of computing applies: always, always, always make a back-up copy before modifying a utility program. Once in DDT, a half-attentive keystroke or a slip of the pinky finger can alter the object code introducing the sneakiest, most camouflaged bugs to ever invade computer logic. So back up the original and stash it in your heirloom chest.

If you're planning to make all the code modifications described, you'll probably want to combine them by

```
A>DDT SUBMIT.COM
DDT VERS 2.2
NEXT PC
0600 0100
-ISUBPATCH.HEX
-R
NEXT PC
0600 0000
-GO

A>
A>SAVE 5 SUBMIT.COM
A>
```

Listing 8. The above DDT procedure inserts the patch created in Listing 7 into the Submit utility.

program to increase efficiency. The patches in the fourth, sixth and seventh questions, for example, can all be applied to the PIP utility in one DDT session. Similarly, the patches in the eighth, ninth and tenth questions all apply to the Submit utility.

Also, don't forget to perform the Save command after completing the DDT changes. More than once I followed the patch procedure with the precision of a neurosurgeon and then was astonished to watch the program perform in its usual deviant manner. I had forgotten to save the modified file.

## Second Commandment

Finally, if you've never been afflicted by these problems and you rarely use ASM, PIP or Submit, then you may want to ignore these patches entirely. The second commandment of computing takes precedence: Leave Well Enough Alone. Many CP/M users compute within the boundaries of a word processor, database manager or spreadsheet program and have no need to venture into operating system commands. In these cases, filing the answers away for posterity may be safer than dabbling with DDT (something you thought the EPA banned long ago).

## Final Directions

To summarize, the answers and solutions to these questions will help you safely thread your micro-spacecraft through CP/M-80 chasms that waylay most unsuspecting skip-pers. If you ever travel beyond the familiar orbit of your favorite programs, keep this article posted next to your compass just in case. Without it, a casual trek away from the beaten path could lead to... the Twilight Zone. □

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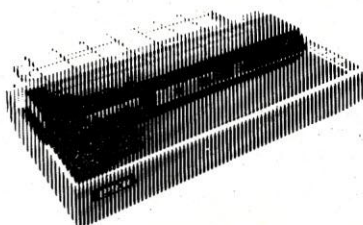
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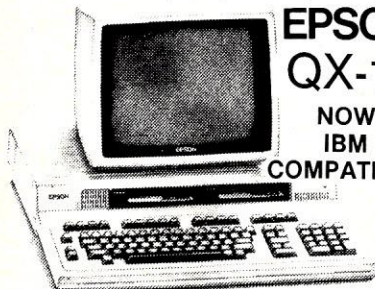
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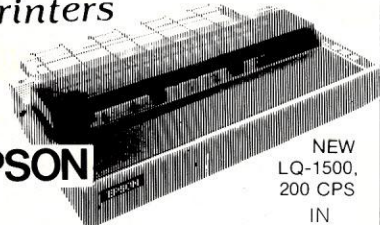
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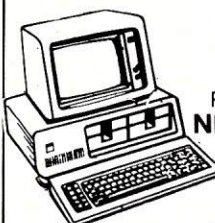
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# Connect Time

By Chris Crocker

## Bulletin Board Basics

### A How-To Primer for Nationwide Networks

If you've been wondering what to do in your spare time, I may have the answer for you. All you need is a personal computer, a modem and communicating software, and hundreds—possibly thousands—of bulletin board systems will be available to you.

Some systems are run by individuals, some by interest groups and some by businesses like computer vendors, modem manufacturers and software houses. Most systems are free, although you do have to pay for your telephone call if it's long distance.

While many bulletin boards are unique in flavor and subject matter, only a handful of basic types exist. Usually, these types are defined by the program that operates the bulletin board itself.

If you try out some of the BBSs, you'll see names like AMIS, ABBS, RBBS, RCP/M, NET-WORKS, Connection-80 and the like, each referring to the specific bulletin board software used to operate that BBS. While the names may confuse you, remember that bulletin board systems are intended primarily for public access. Therefore, you can learn

to use bulletin boards relatively easily, and the best way is to go ahead and try one.

#### Ground Rules

There are a few ground rules for using bulletin board systems. Most of these boards run on personal computers, and the board's complexity and error-trapping may not match that of the major on-line networks. BBSs are more volatile and sensitive to misuse. While anyone with the intention of messing up a BBS can do it relatively easily, you won't if you remember a few simple points.

First, don't ever hang up on a bulletin board system without formally signing off—through whatever options the system provides. In many cases, hanging up may crash the system until the system operator (SYSOP) resets it again. Of course, if you call and—for one reason or another—just get garbage on your terminal, there's not much else you can do. Generally, though, you'll save fellow callers and the SYSOP a lot of frustration if you remember to log off properly.

Secondly, enjoy yourself, but don't dawdle on popular bulletin boards. If you're making a long-distance call, you're wasting money. You're also tying up the system while someone else may be trying to call. After you've spent an entire evening listening to busy signals, you'll know what others are going through while you're tying up the system.

Third, there's a proper place and time for everything. For the benefit of the operator and users who might be offended, limit profanity or suggestive language to those systems that welcome it.

Fourth, and most important: Try, if you can, to be not just a user on bulletin boards; become a *participant*. If you can add a little bit of your own insight, information, programming prowess or whatever to a bulletin board system, then you've made the SYSOP's efforts worthwhile. Bulletin boards are an excellent medium for the exchange of ideas and information.

I'm not going to spend time describing how to use all of the different types of bulletin board systems because, for the most part, it isn't that difficult. Most systems are



menu-driven and provide near-plain-English prompts and help messages along the way if you're stuck. Usually, pressing H or ? will bring you to an understandable menu or a help message if you're on-line and in a bind. When you're ready to sign off, try either G, OFF or BYE to exit gracefully.

### Your First BBS Call

When you dial up a bulletin board system for the first time, press return twice to match your transmission speed with that of the BBS. Soon, an opening message welcomes you, and then the computer asks you a number of questions, like your name, your city and state, and your telephone number. Some systems request a password.

Respond to the password prompt with NEW (or whatever option is recommended on the screen for first-time users). At this point, you may be asked some specific questions about your computer, such as whether or not you support lower-case and how many nulls you need. Nulls are used to allow the carriage of slow printers to return from the end of a line before starting the next line. If you're not using a printer as a terminal, just answer 0. Some boards ask you for your screen dimensions in characters (or columns) and lines, so that the system can format the text to be most readable for you.

After you've answered these basic questions, you may be asked for or offered a password to use the system. This password will allow you to log-on much more rapidly in the future and will be handy for securing information later. Write your password down. It's a pain in the neck for BBS operators to have to remove duplicates from the user directory just because people forget their passwords on later calls. Also, on those boards that limit system use for first-time callers, you may never get a chance to see the rest of the system if the system doesn't know that you've signed on before.

Once you've gone through the preliminaries, a menu of what's avail-

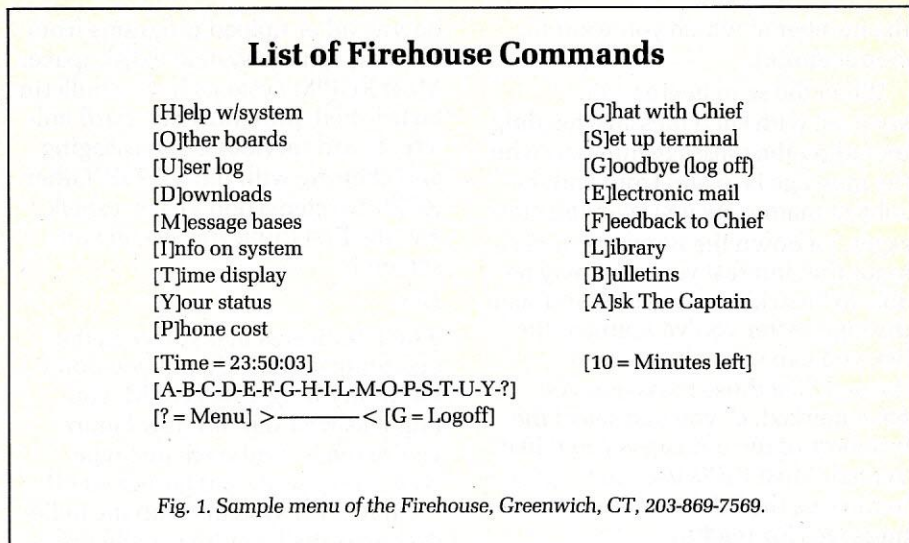


Fig. 1. Sample menu of the Firehouse, Greenwich, CT, 203-869-7569.

able on the system appears. A sample menu is shown in Fig. 1.

Enter the first letter of one of the options listed to select that option. If, for instance, you want a list of other bulletin board systems, type O. (You may have to press return.) Shortly, a list of other bulletin boards and their telephone numbers appears. If you can't capture text on disk with your software, use Control-S to pause and restart the display (you may have to use Control-Q to restart) while you write down the numbers.

If, for any reason, only a list of initials comes up on the screen like <A-B-C-D-E-F-G-?> without a full menu, just press ? and the menu should appear.

### Messaging

The most popular use of bulletin boards is messaging. In most systems, you can scan, read and post bulletins and public messages to other users. Here's the typical format (fortunately, the content isn't typical) for a BBS message:

```
Message #2328
TO: GIZMO
FROM: WIDGET
SUBJECT: YOUR WHATSIT
DATE: 10/07/84
NOW I'VE HAD JUST ABOUT ENOUGH OF
YOUR XYZ AND I'M NOT GOING TO SUB-
MIT TO THAT KIND OF DRIVEL
ANYMORE, SO SHOVE OFF OR I'LL
TELL ASTEROID BREATH.
```

Some bulletin boards are clubby, with most of the messages filled with stuff like this. On one hand, I'm sure that as a first-time user of a bulletin board system, you won't find such messages extremely helpful in your current or future life (unless, or course, you already know Gizmo, Widget or—heaven forbid—Asteroïd Breath.) Granted, bulletin boards should be used for communicating, on whatever level suits the participants.

On the other hand, message boards can be packed with useful information about worthwhile subjects ranging from computing hints and tips to golfing advice. I've read long threads of messages from several people all helping to solve one person's technical problem, and I've learned a lot in the process. I've also read of employment opportunities and found some great advance tips on upcoming products from people who ought to know.

Scan the most recent messages to acquaint yourself with the bulletin board you're trying out. Select a message board or e-mail option from the main menu and then select Scan from the submenu. In most systems, the messages are numbered, the highest number being the most recent. You may be prompted to provide a starting number for the first message you'd like to scan, as well as



the number at which you want to stop scanning.

When the scan begins, you see a list with each message heading, including the message number, who the message is to and from and the subject matter. As you scan the messages, jot down the numbers of messages that interest you. You may be able to "mark" messages as you scan through. After you've scanned the list, you can go back and read through just those messages you have marked, or you can select the numbers of the messages you'd like to read. Most BBSs use the R option to retrieve the full text of selected messages for reading.

On some bulletin boards, you can scan messages by keyword, so if you're looking for information on 1200 bps modems, for example, you might scan for 1200 or bps or modem. If you're looking for IBM information, you'd scan for IBM.

Posting a message is relatively simple as well. After you select a sub-menu option, such as Post or Write, you just enter the text with carriage returns at the end of (short) lines. You may have an opportunity to edit your lines after you've pressed return, using line editors similar to those on the major networks. Most systems provide a prompt that tells you how to close the message. The system should also ask you for whom it's intended (such as Apple Owners, Bob or All) and what the subject matter is. Once you've created your message or bulletin, it may be posted immediately, or set aside for the SYSOP to screen before it's placed in the message queue.

Of all of the bulletin board systems I've visited, two types take a little extra bit of getting used to: RCP/M and conference-tree systems.

### RCP/M Systems

RCP/M systems are specifically for the exchange of public-domain CP/M programs. The systems actually place you in a CP/M operating system environment, where you call up drives and user areas (A1:, B3: and so on) for directory listings and

download or upload programs from or to the remote system's disk space. Most RCP/M systems have a bulletin board shell, providing standard bulletin board services like messaging and chatting with the SYSOP. Other RCP/M systems don't have a shell, and the first thing you see on your screen is:

```
A0>
```

which indicates that you're in the operating system area. If you don't know anything about CP/M, you might as well sign off now before you're really confused. Just type BYE, and you should be signed off.

On RCP/M systems with the bulletin board shell, you're usually provided a Download Area or CP/M option on the main menu. When you select this option, you may be asked a question to verify that you know something about the use of CP/M before the BBS dumps you into the operating system area.

Once you're in the operating system area of an RCP/M BBS, use it like you're using the CP/M operating system on your own computer. You change drives by typing the drive letter and a colon and pressing return.

Most RCP/M systems have numbered user areas to section off their files, so you may be required to use a letter and a number in the drive assignment, such as B1:, meaning drive B, user 1. DIR provides a user area directory, and Type[filename] dumps the contents of a nonobject code file on your terminal. Most other CP/M commands will work as well. If you want information about the specific RCP/M system, you might want to type the file on A0: named SYS.DOC or something similar. There are also programs that can be executed on the remote system such as CHAT.COM (executed by typing CHAT and pressing return), which pages the SYSOP to chat.

Downloading and uploading on RCP/M systems uses a telecommunications program supporting the Christensen protocol, such as the public-domain Xmodem, Modem 4, or Modem 7. Some commercial soft-

ware also uses this protocol; check your documentation. The larger programs on RCP/M systems are "squeezed" for transmission, and should be "unsqueezed" after transmission so that they assemble and read properly. In an RCP/M directory, you'll see a number of files with a Q in the suffix, indicating a squeezed program. There's usually a version of the unsqueeze program on the RCP/M directory as well.

If you're in an RCP/M system and you want to get back to the messaging portion, type RBBS (on some systems, the command may include an extra character like RBBS P).

### Conference-Tree Systems

Conference-tree systems are different in two ways: first, you really have no menus to select options from, and second, conference-tree systems use a unique organization for messages.

While most bulletin boards post messages sequentially so that a response to message #2321 might be message #2400, conference-tree systems work on a different basis: the family tree. The main message posted might be called "conferences," or something similar. This message could be considered the ancestor from which all other messages are descended. Type Read Conferences for a list of all of its "children," or conferences that spring from that main message. The children will, in turn, have children (submessages within the larger conference), and so on and so on. In any case, use Read and the individual message name to retrieve and review any given message or to start your way through the system.

What makes conference-tree systems particularly interesting is that you can select a subject relatively high up in the family tree, trace the responses down through the generations, and find a relatively thorough discussion of that subject, following whatever path you wish. In nonconference-tree systems, you may have to do a bit of hunting to locate the next pertinent response.



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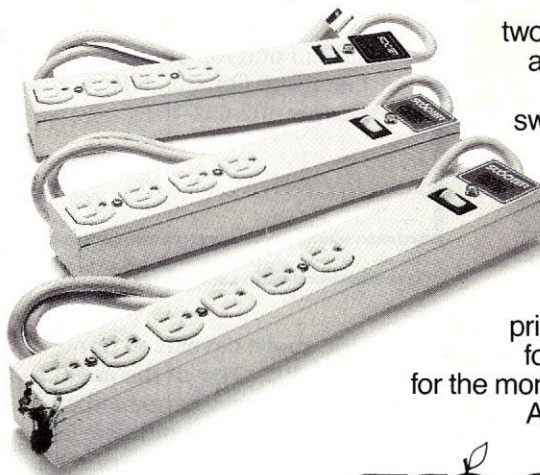
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To send a message, you use the AddTo command, which adds your message to an existing message. The Browse command is like scanning, only it provides the first line of each message requested. Help is like any other message on the system. You type Read Help [subject] to review the documentation for specific features, or type Read Help Complete for the works.

### A Current Crisis?

At one time, only a handful of personal computer owners had modems and telecommunications software. This is no longer the case. The telephone lines are literally jammed with callers in some cases, trying to get through to the more popular boards. It's not uncommon to spend an entire evening redialing your favorite BBS just to check your messages.

Simply put, some bulletin boards have become too popular. The regular users can't even log on because so many new people are tying up the systems.

The long-term results of this are already developing. While the bulletin board boom continues, some SYSOPs have to make some difficult decisions. Of the 20 or so systems I called this month, seven or eight had changed to unpublished numbers, were not accepting new users, didn't answer or were disconnected entirely. In a few cases, systems that were formerly free systems are now levying fees for anyone who wants to use them. As a milder measure, SYSOPs might request (not require) donations to support their systems.

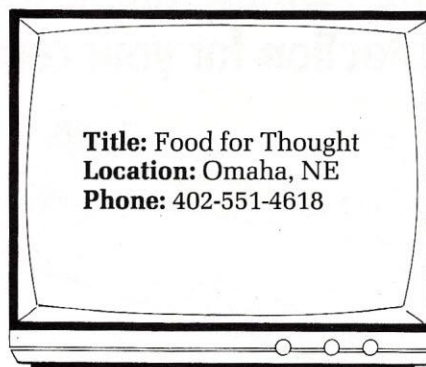
I suspect more will follow suit—it's just not possible to maintain a system well with such heavy usage. Still, plenty of BBSs exist whose SYSOPs would love to have more callers to contribute their ideas, enthusiasm and programs to share with other callers and to improve the overall quality of their services. A bunch of new systems show up every week, too, and I still believe that everyone should have a chance to try the systems out.

### Selected Bulletin Boards

There are some good sources for bulletin board numbers and information. Subscribers to CompuServe and The Source have access to a huge list of BBSs provided and maintained by Bill Blue of the People's Message System. Another good place to find listings is *Plumb*, published by Riverside Data Inc., PO Box 300, Harrods Creek, KY 40027. Mike Cain's *The Computer Phone Book*, published by Plume/New American Library, has thorough listings on bulletin boards as well.

The problem with published lists of bulletin boards is that they're out of date as soon as they hit print. New boards pop up daily. Also, the majority of the BBSs are run by volunteers, and because BBSs usually operate on a standard personal computer and one phone line and are susceptible to misuse, they're very volatile. A number published one week can be disconnected the next week. In some cases, new SYSOPs don't realize what they're getting into—it's fun, but it can't be easy or cheap. □

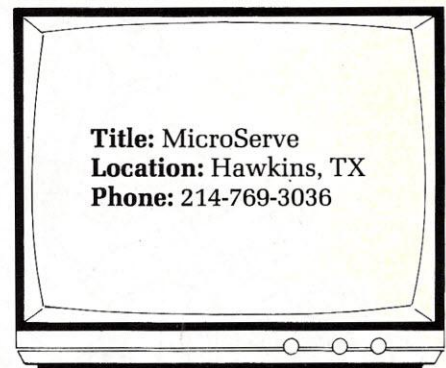
### BULLETIN BOARDS VISITED



With the above caveats in mind, I'm going to list a few of the most interesting BBSs that I happened upon in my research for this month's column. Unless otherwise noted, each of these operates at 300 bps, eight bits, one stop bit, no parity—and may also operate at seven bits and even parity as well.

Welcome to la-la land. This bulletin board is well into the outer limits. As a user, you are a citizen of Proteus, an imaginary planet. The SYSOP, known warmly as The Blue Adept, guides you through your first visit to the board.

The messages on this system are chatty—with lots of talk about science fiction, especially about Dr. Who. If you're into it, this might be the place for you. If you're not, sleep with both feet on the floor after you log off.



This system was in the PMS bulletin board listings as a football-oriented BBS. While sports are a part of this system, I found that they're only a small part relative to the rest of the information available. As the name suggests, MicroServe is like a miniature on-line utility, including news, reviews and selected articles. When I logged on, there was an interesting article about "The Computer Abuser Subculture."





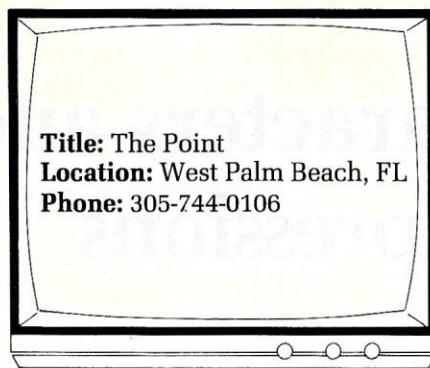
The subject of this bulletin board was listed as "couples." Being the naive sort of guy I am, I thought I'd call and see if there were any hints or tips on marriage, relationships or dining out. I should have been a mite suspicious when I had to promise I was over 21 to get onto this system. Maybe the warnings about explicit material should have stopped me. Finally, when the messages I scanned had listed subject matter like gay, kinky or straight, I caught on. I was in the midst of a sexually oriented BBS. Being the trooper I am, I decided to read my way out. There wasn't much to read, though. Most of the messages with any promise for even the most prudish voyeur were passworded. Needless to say, I hastened my retreat. If you're not into this stuff, don't bother wearing out your autodialer. If you are, or if you're looking for company in St. Louis, you can join the more than 14,000 people who have called this system.



**Title:** The Flying Circus  
**Location:** Great Falls, VA  
**Phone:** 703-759-6627

This is an RCP/M bulletin board system, and the central reason for my having listed it at all is that its download area is better documented than most I have seen. It's a good board to try if you're thinking about doing your first download of public-domain software.

Address correspondence to Chris Crocker, PO Box 702, Peterborough, NH 03458, or contact him on CompuServe: 70116,752; The Source: BBW440; or Delphi: MICROCOMP.



**Title:** The Point  
**Location:** West Palm Beach, FL  
**Phone:** 305-744-0106

The Point is a family-oriented system, with subject matter including "Teen Corner," games, "Laurel's Kitchen," an over-50 club and more. While I found the system to be a bit sluggish, I do think that it provides a wholesome approach to bulletin boarding. That's refreshing after visiting some of the other boards.

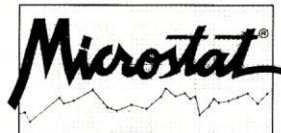


**Title:** KGON Rock BBS  
**Location:** Portland, OR  
**Phone:** 503-657-9526

This is a must for rock fans. In addition to a rock-oriented messaging area, KGON also provides listings of top 30 airplay LPs, new MTV videos and Billboard charts. A word of warning: This system only presents a full menu if you press [?] in response to the first string of letter options.

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# The Unix Pipeline

By Phil Hughes

## Special Characters and Regular Expressions

### Using *Grep*; Permutations to Avoid Pitfalls

Last month I talked about the file security features of Unix. This month, I explore what are called regular expressions and then I'll look at *grep*, a pattern-matching program that uses regular expressions. I also have some more information on AT&T's 3B2/300 computer system and the details of the AT&T announcements regarding its new PC-compatible system.

#### Pattern Matching

As I explained in a previous column, the Unix shell offers several pattern-matching capabilities. These consist of two types of wild cards (\* and ?) and the choice operation represented by [ ]. Regular expressions are similar to the pattern-matching capabilities of the shell but offer more sophisticated operations.

You can use regular expressions in *awk*, *ed*, *grep*, *lex* and *sed* to search for patterns. That's the good news. The bad news is that some of the regular expression metacharacters overlap with the shell metacharacters. Once I define regular expressions, I'll use *grep* as an ex-

ample and show you how to avoid the pitfalls.

#### Regular Expressions

First, look at Table 1, which shows the special characters used for forming regular expressions. The first table entry is just a single character. Any nonspecial character just represents itself. For example, the character *x* would just represent a match string for the single character *x* in the strings you're searching.

If you want to match a character that's one of the metacharacters for forming regular expressions, you must "escape" it. To do this, you precede a character with a backslash (\) and it loses its special meaning. For example, to escape the special meaning of a backslash, precede it with an additional backslash. Thus, \\ matches a single backslash. The only character that cannot be escaped and, therefore, cannot appear in a regular expression is the newline character.

The third table entry is the period (.), which will match any single character. This is the same as the ? wild card character in the shell.

For example, the string *te.t*

will match any four-character string whose first two characters are *te* and whose last character is a *t*. If you were searching a document with this regular expression, it would find words like *test* and *text*.

A string of characters enclosed in brackets ([ ]) will match any single character enclosed in the brackets. For example, the regular expression [123]

will match the character 1, the character 2 or the character 3. Remember, it only matches one character, not a string of characters. If the first character within the brackets is a caret (^), it means reverse the meaning of the test. In other words, match anything except what follows. For example, the regular expression

[^123]

will match any single character except the characters 1, 2, 3 or newline. For this to work, the caret must be the first character in the brackets.



# The Unix Pipeline

Within the brackets, a match range can be indicated by specifying the lower and upper bounds separated by a dash. For example, the regular expression

[0-9]

will match any single digit. This is equivalent to

[0123456789]

The regular expression

[A-Za-z]

will match any single upper- or lowercase letter.

The asterisk (\*) is used to signify that a one-character regular expression may be repeated. A repeated match is satisfied if it matches zero or more times. For example, the regular expression

[0-9]\*

will match a string of zero or more digits. The answer to the question that you are about to ask is

[0-9][0-9]\*

This string will match one or more digits. This works because regular expressions can be concatenated (stuck together) by placing them adjacent to each other. This is actually the last rule in Table 1.

Two more metacharacters are the caret (^) and the dollar sign (\$). If a caret appears at the beginning of an entire regular expression (as opposed to its use inside brackets), it signifies the beginning of the line. The dollar sign appearing as the last character of a regular expression signifies the end of the line. Therefore, to search for all lines that start with a digit, you use the regular expression

^[0-9]

and to search for all lines that end with a digit, you use the regular expression

[0-9]\$

Combining these two examples, you use the regular expression

^[0-9]\*\$

to search for all lines that contain nothing other than digits.

c	the character c
\c	character c (for special characters)
.	any character except newline
[str]	any one character in str ([a-b] means all in range a thru b)
[^str]	any character except str or newline
re*	0 or more occurrences of 1 character re
\re\)	group re for later reference
\n	nth re in \(. . . \)
^	beginning of a line
\$	end of a line
string of re's	concatenation of listed re's

Table 1. Regular expressions (re) for grep.

## GREP—Search File for Pattern

% **grep** [options] expression [files]

**stdin** used if no files specified

Options:

- b precede line with block number
- c print count of matching lines only
- l print only names of files with matching lines
- n print line numbers
- s suppress file error messages
- v print nonmatching lines

Table 2. Grep command synopsis.

## Conventions:

A % represents the system prompt.

**Boldface** represents items that must be typed as they appear.

*Italics* represent items that are to be substituted for.

Brackets [] surround items that are optional.

## Basic Tool

I hope I can explain the following regular expression in less time than it took me to figure it out. This is one of those Unix features that I've avoided. It seemed like it was more trouble to learn what it did than it was to find another way of doing the same thing. Now that I understand it, I see that it's really a basic tool.

First, to quote the complete definition from the *Unix System User's Manual*, "The regular expression (RE) enclosed between the character sequences \ ( and \ ) is an RE that matches whatever the unadorned RE matches."

The first thing I want to say to that is—now what? Well, what is

missing from the explanation is that the \ ( \ ) sequence assigns a name to the string matched by the regular expression within the sequence so that the string can be referenced later in the same regular expression. The names that reference the string are assigned sequentially within the regular expression, the first being \1, and the nth being \n.

Looking at a simple example, the regular expression

\(. . . \)\1

will match any line that has two adjacent occurrences of the same three-character string in it, such as

test 123123

This works because the . . .



matches any three character string, and the `\1` matches whatever the ... matches if it occurs immediately following the characters matched by .... It won't match the line

```
test 123 123
```

because the two strings aren't adjacent. The regular expression

```
\(...\).*\1
```

will match the second case as well as any other line that has the same three-character string repeated anywhere in the line. This works because the `.*` matches any number of characters. If this has left you totally confused, don't panic. Hopefully, the example using `grep` will show you where this is of use.

These are all the metacharacters that are used to form regular expressions. Some programs such as `egrep` have additional metacharacters, but in the interest of sanity, I'll confine this column to the capabilities of `grep` only. Now, armed with the power of regular expressions, let's look at `grep`.

## Grep

Many of the Unix programs have strange names. `Grep` is no exception. It simply stands for get regular expression. This makes it an almost reasonable name for a program that uses regular expressions and searches files for patterns.

Before I get into the details of `grep`, let me mention the other two programs in the family, `egrep` and `fgrep`. Using my imagination, `fgrep` stands for fast `grep`, as it only works with fixed strings and is, therefore, much faster than `grep`. Again, `egrep` must mean extended `grep`, as it allows for additional metacharacters in regular expressions.

The function that `grep` performs is rather simple. It just searches files (or standard input) for a pattern and then prints out the results. The results consist of printing counts, matching lines, line numbers, filenames, nonmatching lines or some combination of these.

Table 2 is a synopsis of the `grep`

- 1: This is some test text to test `grep` on.
- 2: With the use of regular expressions you
- 3: can do amazing pattern matching things.
- 4: For example, you can find the lines that
- 5: have multiple this and that things.
- 6: Then again, this test file then has a
- 7: few funny things in it to look for.
- 8: That is what I hope that you can see.
- 9: A final line containing line twice.

Fig. 1. `Grep` test file.

```
grep $1 <<###
Phil Hughes      367-8649
Greg Winters     821-5030
Steve            322-8422
Ellen            789-6121
PWS              232-4700
Metro Bus bus    447-4800
###
```

Fig. 2. Simple phone list using `grep`.

command. Again, this is extracted from Specialized Systems Consultants' System III command summary. If you're running other than Unix System III, you may have more or fewer options available, but the general syntax is the same. The common options are `-c`, `-l`, `-n` and `-v`.

## Options

With no options, `grep` prints the contents of all lines that match the expression. The `-c` option causes it to print only the count of the number of lines matched, not the actual lines. The `-l` option prints only the names of the files that contain the expression. The programmer's common use of this option is to locate all references to a particular file.

The `-n` option adds the line number of the matched line to the output. This is useful if you plan to edit the file if it contains the pattern. You can go directly to the line (once you're in the editor) instead of having to search again. The `-v` option causes `grep` to print only those lines that do not match the expression. This could be used to

delete all lines that contain a particular sequence.

The `grep` command line consists of the options, followed by the regular expression that you want to match for, followed by the names of any files that you want to search for the pattern. Note that `grep` works with multiple files, so you can search a whole directory for all occurrences of a pattern using the shell metacharacter `(*)`.

## Test File

Fig. 1 is a test file that I'll use in the following examples. The line numbers aren't actually part of the file; they're just for reference. First, let's try an easy one. Let's look for all lines that contain `th` or `Th` and print the line and line number.

To do this, you use braces to signify a choice. But braces are also shell metacharacters, so it's necessary to enclose the regular expression in quotes so the shell won't attempt to analyze and expand the expression. The resulting command line is

```
grep -n '[Tt]h' greptest
```

Analyzing this line, `grep` is the command name, the `-n` option tells `grep` to print the line numbers of the matching lines, the quoted string `[Tt]h` is passed literally to `grep` and is a regular expression that meets the criteria, and `greptest` is the name of the data file. If you run this command and `greptest` is the file in Fig. 1, it'll print out the line numbers and lines for the first eight lines. Not too exciting, but you can see that `th` or `Th` does appear in each line.

Let's go on to a more selective pattern. The following command will select all lines that start with `Th` and have at least one other word in the line that contains `th`.

```
grep -n '^Th.*th' greptest
```

This pattern selected lines 6 and 8 only. Analyzing the pattern, the leading caret anchors the search to the beginning of the line. Therefore, `Th` must appear as the first two characters of the line. Following this is `.*`. The period matches



any character and `*` signifies that the match can be repeated zero or more times. This will match anything else in the line. The final `th` matches any `th` sequence appearing anywhere in the line after the initial `Th`. Sounds like what we wanted.

## Next Step

Now, let's try something a little harder. Let's print out all lines that contain words that start with `th` followed by `a` or `i` and have more than four letters in them. To find the beginning of a word, assume that it'll be preceded by a space. Brackets can be used once again to accept either `a` or `i` for the third letter. If the word is to have more than four letters, then all you have to do is ensure that the fourth and fifth letters aren't spaces. The following `grep` command will accomplish this task:

```
grep -n 'th[ai][^ ]*' greptest
```

This will select lines 3, 5 and 7 because they have the word *things* in them, the only word that matches the pattern.

One last example and then I'll show you how to make a useful shell script using `grep`. It's a simple one just to reinforce the use of the `\( \)` sequences. Let's look for all lines that contain the same word twice. For the sake of simplicity, assume that a word is both preceded and followed by a space. All you have to do is locate a sequence of characters that starts and ends with a blank, has at least one character in between and then see if it occurs again. The following command performs that task.

```
grep -n '\( . * \).*\1' greptest
```

It will find a match in lines 1 and 9. In line 1, it's because the word *test* appeared twice and in line 9 because the word *line* appeared twice. *That* and *that* in line 8 are different, of course. The expression enclosed in the `\( \)` pair consists of a leading space to match the space to indicate the beginning of a word, a period to match at least

one character of any sort, the period asterisk regular expression to match zero or more characters and a trailing space to match the space after the word. The next `. *` sequence matches any string, and the following `\1` matches the next string that is the same as that matched by the expression enclosed in the `\( \)` sequence. In this case, all words in a line are checked until one is found with a duplicate.

## Number, Please

Let's look at an example of using `grep` to look up phone numbers in a list. Fig. 2 shows a simple shell script. A shell script is a file of shell commands used like a function or program. Parameters can be passed to the script when it is invoked. The file must have its execution bit set as described in my September column in *Microcomputing* (p.36).

Probably the most complicated part of this script is the use of a shell feature called a *here document*. This is signified by the `<<` sequence in the first line. The following characters specify the end of file indicator. All following lines (until the end of file indicator is found) are read as standard input.

When you invoke this script, the first parameter from the invocation line (represented by `$1` in the script) is sent to `grep`, where it's used as a pattern. No file is specified so `grep` reads standard input, which is actually the list that follows. Whatever string you entered on the invocation line is then searched for, and any matching lines are printed.

You're not required to type in all of the line or all of the name. In fact, the same script can be used to look up the owner of a phone number by entering the phone number instead of a name. The line that starts with *Metro* is the local information number for *Metro* transit. *Bus* and *bus* are in the same line, so you can ask for this number with either of these three names.

Using this same scheme, you could enter lists containing addresses and then select all entries with a particular ZIP code or range of ZIP codes. If you start thinking of all the reports you could generate, it's time to look at `awk`, a program that uses regular expressions but was designed both to scan for patterns and process the results. But that's another column.

## Using the 3B2

Earlier this month, I taught a C programming class to the local AT&T software technicians. (Don't tell anyone—I know everyone at AT&T is already supposed to be a C and Unix expert.) Anyway, they furnished the computer, a 3B2/300 running System 5. I didn't run any benchmarks, but I got a chance to see how it worked under real conditions—what I would consider a more useful test.

The class had ten students and five terminals. One terminal was running at 9600 bits per second (bps) and the other four at 1200 bps. We also had a printer connected to a parallel port. The students were editing short files using `ed`, compiling and executing simple programs and using a few of the Unix utilities. Compilation times varied from about 20 seconds to a minute or two depending on the size of the program and the activities of others—basically the same as I would expect on my Codata under the same conditions.

The most exciting thing was that the 3B2 really exists, seems to run fine and offers a chance to get a Unix system from the makers of Unix at a reasonable price. One other impressive feature is that the power switch is really a software feature. When you depress the on switch, the system powers up, self tests, configures itself, boots Unix and then turns on the green ready light. When you press off, it sends out shutting-down messages to users, then gracefully shuts down Unix and turns itself off. This



# The Unix Pipeline

makes it the first system I've seen that you could put into the average office and expect to use without a computer person on call.

On the negative side, I discovered that things like the C compiler and the word processing and typesetting utilities (*nroff*, *troff*, *eqn*, *tbl*) are options on the 3B2. I feel that this is a mistake. It only encourages other companies to come out with different software for the same tasks, thus decreasing the chances for a converging standard Unix. I don't expect this to have a big effect on AT&T's profits, but it sure will complicate life for those of us who use Unix.

In summary, the 3B2 looks like a real Unix system. It's compact (3.5 inches high by 20.5 inches wide by 17 inches deep), expandable (to 18 serial ports) and runs real Unix. I think it'll give the competition a run for its money. By the way, if you're the competition and you think I'm wrong, drop me a line and tell me why. I would like nothing better than to see the little guy win the Unix wars.

## July S/ug Meeting

The date of the July Seattle Unix Group meeting corresponded with

a national announcement by AT&T Information Systems. Attendees at the S/ug meeting were victimized by an AT&T marketing talk and then allowed to play with two AT&T products. Here's the blow by blow:

The AT&T presentation was slick but of little interest to anyone who had already heard of Unix—too bad, as the captive audience numbered around 200 people with an average of two years of Unix experience apiece. I think AT&T missed a good chance.

After lots of announcements (such as six new printers), the real meat of the presentation was the introduction of the PC6300, a machine compatible with the IBM PC. Actually manufactured by Olivetti, with a monitor designed by Panasonic, it does sound like a real contender. It's based on an 8086 running at 8 MHz as compared to the 4.7 MHz 8088 in the IBM PC. It should significantly outperform IBM's product with pricing at about five percent below IBM.

Why is this in a Unix column? First, because I'm frustrated that nothing real was announced at the meeting. Second, and probably much more important, AT&T has announced software to intercon-

nect the PC6300 to the 3B2 Unix system as well as mainframes using SDLC and a host of other protocols. It sounds like AT&T is jumping into the computer business whole hog. Remember, it's only been in the computer business since January. Time will tell how serious AT&T is, but it looks real so far.

## Questions from Readers

John R. McCarthy writes looking for a version of Unix that will run on his PDP-11/20. For those unfamiliar with the DEC PDP-11 line, the 11/20 is a circa 1970 mini and was the first PDP-11 that Unix ran on. I contacted Venturcom (Cambridge, MA), the company that developed Venix, a Unix port for small PDP-11s, but the answer was no go. Anyone out there able to help John?

In next month's column, I'll discuss two common Unix editors, *ed* and *vi*. Also, I'll have more reports and rumors from the Unix community. If you have a report or a rumor that you feel I should investigate, drop me a line. I'll see what I can do. □

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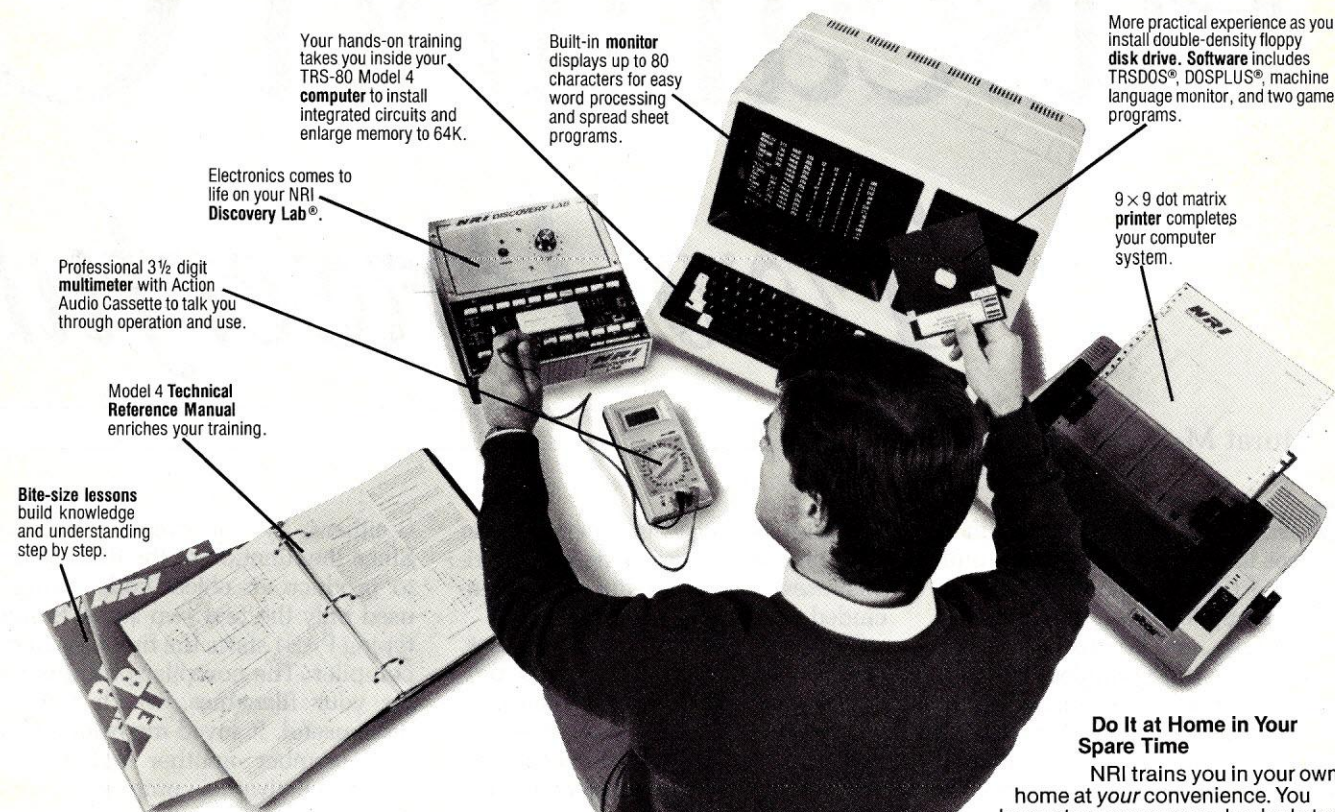
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# Pascal and C

## *Two Powerful*

By Murat M. Tanik, Ph.D.

**P**ascal and C are two very different languages, both in the philosophy of their creation and in their intended applications. Each has its devoted fans, and Microsoft has developed powerful compilers for both languages. I'll review the most recent version of each Microsoft system by itself and then briefly compare the two compilers to determine which is best suited for certain applications.

### Pascal Plateau

The state-of-the-art in programming still can't provide the means to create large programs that are error-free. But, after a ten-year period of struggle and experimentation, the design and production of Pascal compilers has finally reached its plateau. Good Pascal compilers are now available, and Microsoft's Pascal compiler version 3.20 is certainly one of the best.

Microsoft Pascal (also called MS

Pascal) is packaged in a clear plastic easel-type box. Even a note on various uses of the flip-top box is included.

The manual comes in two volumes, which are typeset and of good production quality. The first binder contains a user's guide (168 pages) as well as the first part of the reference manual. The second binder contains the rest of the reference manual, which totals 459 pages. Extensive detail is provided and the organization certainly isn't intended for beginners.

It took me about 30 minutes to flip through the user's guide, create my working copy of the compiler (on a hard disk IBM PC) and compile, link and run example programs provided by Microsoft. I can't complain too much about the user's guide except to say that the general organization of the reference manual should be improved.

Compiling a program in MS Pascal

is either a two- or three-step process. Since the function of the third step is to produce an object code listing, I used only the first two steps. Simply typing PAS1 starts the first pass of the compiler. The compiler prompts you for your filenames, which I found quite useful. It saved me from having to remember another string command to activate a compiler.

After the completion of the first pass, I typed PAS2 to start the second pass. The second pass doesn't prompt for any input but simply performs its function.

After completing the compilation process, I started the linker by typing LINK (I liked this too, instead of typing LINKMT, LNK86, L068 and so on). The linker prompts you for your filename and run-time library location. I typed PASCAL after the libraries prompt, and the linker took it. Later, I found a sample session display on page 31 of the manual. This kind of user interface can be considered reasonably friendly. Of course, you can create a batch file for executing a series of commands with MS DOS. This facility can be used to compile, link and run Pascal programs with a single command.

### Benchmarks

It's almost impossible to talk meaningfully about the comparative performance of compilers in a short review, but to give you an idea, I ran some benchmarks. I used the well-known Eratosthenes prime number sieve benchmark to compare MS Pascal with Pascal/MT+86, Turbo Pas-

		Code Size (in bytes)	EXE file Size (COM for Turbo) (in bytes)	Execution time (in seconds)
MS Pascal (v.3.20)	Sieve	229	27708	11.7
	TrigTan	302	32568	14.2
Pascal/MT+86 (v.3.1)	Sieve	292	10752	14.7
	TrigTan	402	32256	84.2
Turbo Pascal (v.1)	Sieve	288	9029	15.4
	TrigTan	336	9074	17.8
Turbo Pascal (v.2)	Sieve	272	10300	15.5
	TrigTan	320	10347	17.8

Table 1. Benchmark results.



# Compilers —

## MS Packages

cal v.1 and Turbo Pascal v.2. Since I don't have a copy of SBB Pascal, I couldn't compare that with the others.

The next benchmark I used was the calculation of trigonometric values (calculate tangent from sine and cosine). This program is named TrigTan (see Table 1). In both of the tests, MS Pascal performed better than the others.

You should remember that to obtain overall performance information, the set of benchmark programs must be carefully selected to represent all facets of the language, including I/O, file manipulations, arithmetic operations and so on. Time and space limitations don't allow that treatment in this review.

Table 1 summarizes the code size (after compilation), full size (after linking) and execution time for the two programs discussed here (the sieve and trigonometric calculations).

Note that MS Pascal has faster execution time but large .EXE files. It was generally slower in compiling. For example, it took more than two minutes to compile the TrigTan program in MS Pascal. It took about two minutes in Pascal/MT+86. Turbo compiled both programs almost instantly.

Various extensions to the ISO standard Pascal are supported by MS Pascal. These are summarized in appendix B of the reference manual. Some of these extensions are REAL8 type, strings and string functions, various intrinsic and library functions, and separate compilation support (with a mechanism similar to Modula-2). MS

Pascal doesn't implement conformant arrays as defined in ISO standards. Instead, it introduces super arrays to provide the same functionality. Also note that extensive 8087 support is provided.

### Many Features

MS Pascal is a powerful compiler with many features, such as 8087 support, double precision reals, linkage support with assembly language (8086) and Fortran, separate compilation support, strings, address types and long integers. MS Pascal generates native machine code, which will run under MS DOS version 1.0 and version 2.0 provided that default compiler options and standard libraries (PASCAL.LIB, MATH.LIB) are

used. It's also fast. Among the missing things (unless they were hidden somewhere) are a screen editor, a debugger, chaining, ROM call support, port I/O and untyped files.

Model	Program Address Space	Data Address Space
S	64KB	64KB
P	up to 1MB	64KB
D	64KB	up to 1MB
L	up to 1MB	up to 1MB

Table 2. Memory models.

	Size (in bytes)				Time (sec)	Time (sec)
	.C	.MAP	.OBJ	.EXE	(10 iter.)	(50 iter.)
Sieve 104	686	384	432	13824	10.8	52.7
Sieve 203	686	351	595	13906	10.8	52.7

Table 3. Comparison of v.1.04 with v.2.03.

	SIZE (.EXE)	TIME (seconds) (ten iterations)
Digital Research C (Sieve)	25088	11.9
Microsoft C (Sieve)	13906	10.8

Table 4. Sieve benchmark.



**If you're in a position to choose between C and Pascal for a particular application, keep this in mind. Microsoft C is clearly the choice for machine-level applications. . . . Pascal is suitable for educational uses if the object is to teach programming constructs.**

### General Purpose C

The C programming language was originally developed for the PDP-11 under Unix, and it's a general purpose programming language. C has been used for programming Unix applications software, the C compiler itself and the Unix operating system. Since it doesn't impose many restrictions on the programmer, it can be used effectively for many different kinds of projects. The same absence of restrictions also makes it vulnerable to misuse.

The Microsoft C compiler itself was actually developed by Lattice Inc. However, the C compiler system is more than just the compiler. It includes Microsoft's linker and library manager as well as a unified set of documents, totally integrating the MS DOS environment with the C compiler.

### Four in One

The documentation contains four different manuals in one letter-size binder. These manuals include a: C compiler reference manual, linker user's guide, linker reference manual and library manager reference manual. In addition, a copy of *The C Programming Language* by B.W. Kernighan and D.M. Ritchie is included. The documentation package is well-organized, but it's lacking a liberal use of examples. The print quality of the documents is good but falls short of the quality of the Microsoft Pascal manuals.

In less than half an hour (using an IBM PC with a 10MB hard disk), I created my working copy of the com-

piled and compiled, linked and ran example programs provided in the package. You don't have to search through the documentation; Chapter 1, Section 1, contains the operating instructions, which are straightforward enough for any programmer.

### Simple Compiling

Compiling a small program using this C compiler is simple. I typed MC1 FTOC <cr> to start compiling the Fahrenheit-to-Celsius sample program. To start the second phase, I typed MC2 FTOC <cr>, and this completes the compilation process.

You start the linker by typing LINK. The linker prompts you for the filenames. At this point, you should remember that for linkage you need an object file called CS.OBJ as well as the external reference library MCS.LIB. Fortunately, these are well-documented. If you want to use a one-step process to compile and link, you can also use the following batch file:

```
MC1 %1
MC2 %1
LINK CS+%1,%1,%1.map,MCS
```

### Memory Models

One important feature of this MS DOS implementation of the C language is the facility to choose a memory model to compile. All functions in a program must be compiled and linked according to one of the four available memory models. Functions compiled for different models may not be combined. This means that you have to decide which kind of memory model to use before compiling. Memory models are labeled as

S-Model, P-Model, D-Model and L-Model.

Each of these models reflects a different view of the addressing of functions and data within a C program, as shown in Table 2. Note that the memory model concept is an improvement over the version 1.04 of the Microsoft C compiler.

The concept of memory models is a trade-off mechanism between speed and storage (addressability). The C reference manual indicates that the most efficient code is generated for the S-Model. A lower level of efficiency is obtained using the D-, P- and L-Models. The nice part of this mechanism is that if you really need a large address space, you can have it for a price. This memory models approach is dictated by the inherent architecture of 8086/8088 microprocessors. In fact, the Digital Research C compiler has a similar memory model approach.

To give you an idea about the difference between version 1.04 and version 2.03, I used the classic prime number sieve benchmark. Table 3 shows the results. Note that S-Model of memory is used in v.2.03 testing. As far as the sieve program is concerned, there isn't much difference between the two versions (only the generated code is larger).

In addition to the expanded memory addressing capability with four different memory models, version 2.03 provides several new utility functions that allow access to all of the features of the 8086/8088.

I compared the Microsoft C compiler with the Digital Research C



compiler to obtain the results shown in Table 4. Note that Microsoft C produces smaller-size code and executes faster.

The Microsoft C compiler system provides a complete implementation of the C language along with a linker, library manager and a good set of documentation. I'd recommend this compiler to programmers who use C language as their implementation medium. Since 8087 support isn't provided, this compiler isn't suitable for scientific applications.

#### Warranty Provisions

Microsoft provides a standard 90-day warranty for defects in materials and workmanship for the disks for both products. Information about updates will be sent to the users provided that the registration card (included in the package) is completed and returned. In addition, a customer support phone number is provided so you can communicate directly with product support staff.

#### Conclusion

Microsoft seems to have given MS Pascal emphasis for scientific applications (by supporting the 8087 chip) and to have provided extensive support in Microsoft C to access all the features of 8086/8088. If you're in a position to choose between C and Pascal for a particular application, keep this in mind. Microsoft C is clearly the choice for machine level applications.

In addition to scientific applications, Pascal is suitable for educational uses if the object is to teach pro-

gramming constructs. And although neither system is really suitable for business programming, MS Pascal seems to have an edge in this department. Of course, if you're in a position to make the choice, knowing one or both languages, you'll probably have a strong opinion already. ■

#### Microsoft C Compiler System Version 2.03

**System Requirements:** Any MS DOS compatible PC; 128KB; one disk drive; black and white display.

**Price:** \$500.

#### Microsoft Pascal Compiler, Version 3.20

**System Requirements:** Any MS DOS compatible PC; 140KB RAM after loading MS DOS; one disk drive; black and white display; 196KB RAM and two disk drives recommended for easier operation.

**Price:** \$300.

**Manufacturer:** Microsoft Corp., 10700 Northup Way, Bellevue, WA 98004.

Address correspondence to Murat M. Tanik, Ph.D., 2914 Poplar Trail, Garland, TX 75042.

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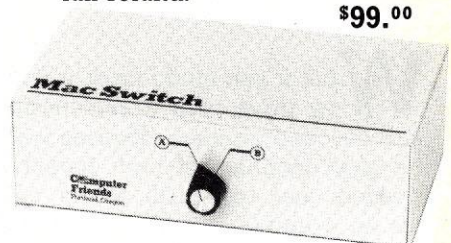
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# Memory By the Boxful

By Dave Rowell  
Technical Editor

*Iomega's Bernoulli Box (a removable-cartridge floppy drive for the IBM PC) is based on the fluid dynamic principles of Daniel Bernoulli. This implementation of his aerodynamic technology offers the storage capacity of a hard disk without the disadvantages.*

What if you could cross a floppy drive with a Winchester hard disk and produce offspring with the good qualities of both parents? Breeders and biologists would call this an example of hybrid vigor. Iomega Corp. of Roy, UT, calls it the Bernoulli Box. Using the fluid dynamic principle discovered by Daniel Bernoulli in the 1700s and some innovative electronics engineering, Iomega has produced a removable-cartridge floppy drive for the IBM PC and XT with the capacity and performance of a hard drive.

The idea isn't new. Bernoulli's principle states that the pressure of a fluid (such as air) decreases when it's moving. This explains why the air current produced by the stream from a showerhead produces a partial vacuum that pulls in the curtain. IBM, following the lead of N.V. Phillips, the Dutch corporation, experimented with and abandoned Bernoulli drive technology in the mid-70s; Iomega's vice president of product management, David Norton, was part of that project.

As implemented by Iomega, the

aerodynamic technology yields impressive results; 35 milliseconds average access time, 1.13MB per second data transfer rate (if the host computer can handle it) and a reliability rate of less than one nonrecoverable bit in  $10^{12}$  bits. The Bernoulli Box comes with one or two drives, which take eight-inch cartridges with a formatted capacity of 10MB. The 10MB unit goes for \$2695 and the 20MB two-drive unit for \$3695. The cartridges cost \$80.

## Ten Microinch Flying Height

Iomega achieves high recorded data densities and media longevity by using the Bernoulli principle to hold a spinning floppy disk at a stable and frictionless ten microinches from the read/write head. According to this principle, the pressure of a moving fluid decreases as its velocity increases. The moving fluid is air flowing between the flat, metal Bernoulli plate (permanently mounted inside the unit) and the spinning floppy disk. Rotation of the disk at 1500 rpm causes air to be pumped in at the disk hub and through the slot in the plate where the read/write head moves, then out around the disk periphery. The thin flexible floppy is drawn to within a few thousandths of an inch of the plate by the resulting lowered pressure (see Fig. 1). The turning disk conforms to the plate shape (flat) and becomes very stable (flutter is less than .001 inch).

The aerodynamically shaped head and its surrounding coupler protrude into the air flow, further reducing the gap and its variability. At ten microinches, the head is able to write 18,000 magnetic fluctuations per inch (comparable to the best Winchesters). Perturbations caused by shock, vibration or dirt on the disk surface result in the disk temporarily pulling away from the head rather than crashing into it (see Fig. 2). The worst that results is a temporary and recoverable read or write error. This is probably Bernoulli technology's strongest point when compared to Winchester drives with their infamous, catastrophic head crashes. Bernoulli air currents also tend to purge foreign particles from the system.

## Slick Engineering

Performance is further improved by some fancy electronics engineering that achieves an areal data density on



the disk of 7.2 megabits per square inch. Using a process called run-length-limited encoding, data is compressed before being written to disk. As a result, an effective 24,000 bits per inch are squeezed into 18,000 magnetic flux changes per inch.

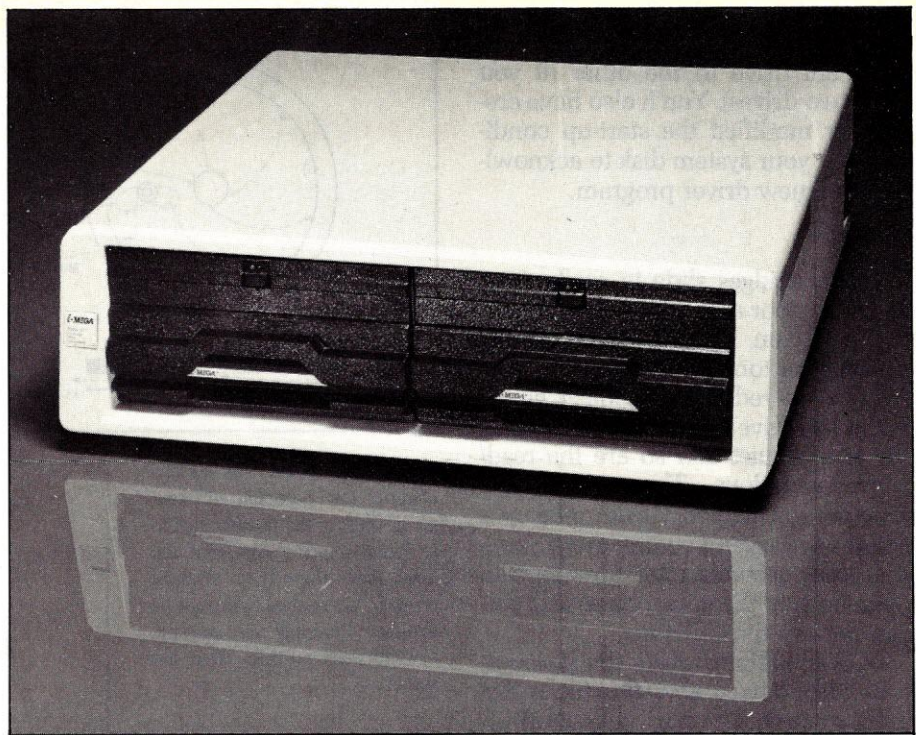
With a radial density of 300 tracks per inch, accurate head positioning is critical. The Bernoulli Box uses an ingenious feedback system that depends on position information from the disk. Each of the 70 sections on a track (64 are used for data) contains a short 27-byte servo field, which is written at the factory. Servo fields are actually located between data tracks; they are offset by half a track. As each sector passes under it, the head reads information from two servo fields simultaneously, one on either side of the track. Because the signals are 180 degrees out of phase with each other, the head can differentiate between them. If the head is dead on track, the two signals will be of equal strength. If the feedback from one field is stronger than the other's, the head position is corrected until they're equal again. Bernoulli Box cartridges have 306 data tracks.

### Enhanced Error Correction

Such high data densities require a sophisticated error correction method. Even small glitches are likely to involve many bits of information. The Bernoulli Box can handle a loss of up to 4096 bits (one 512-byte sector or two 256-byte data fields in separate sectors) on each track, and the error correction process is transparent to the host system.

One of the nondata sectors on each track is used to hold an error correction code derived from a consecutive exclusive Or of the 64 data sectors on that track. The result of the exclusive Or of sectors 1 and 2 is used in an exclusive Or with the contents of sector 3. That result is used to do an exclusive Or with sector 4 and so on. The result of the final exclusive Or with data sector 64 is stored in the error correction code sector.

The contents of any one sector (or any two data fields) can be regenerated by running the data sectors through the same process, but substituting the error correction code for the lost data. The final exclusive Or will yield the lost data. If you're in doubt, try this process with a simpler model using several eight-bit sectors. It works.



Omega Corp.'s Bernoulli Box, a removable-cartridge floppy drive with the capacity and performance of a hard disk drive.

### What You Get

Though deeper and much heavier, the Bernoulli Box looks like the IBM PC's big brother with the same cabinet styling, textures and colors, even an identical on/off switch. I reviewed the two-drive model; the empty cavity in the one-drive Box's cabinet is used for stashing extra cartridges.

The unit comes with a  $\frac{3}{4}$ -size adapter card that fits any vacant slot in your PC and a cable that connects the drive unit with the card. To make the Box act like part of your system, driver and utility programs are provided on a  $5\frac{1}{4}$ -inch disk. You are, of course, supplied with a 10MB cartridge per drive; cartridges are eight by 11 by less than one inch thick.

The IBM-style manual makes hardware installation easy; there's a checklist, and the illustrations include arrows indicating the direction you should turn each screw. Step-by-step instructions show you how to insert the adapter card, make the correct dip switch settings and attach the cable. The manual can be inserted into your PC user's manual and even has pictures suggesting ways to arrange the furniture. I chose to stack my PC and monitor on top of the Omega unit, creating a massive IBM pyramid.

There's nothing in the manual on use of the cartridges. The cartridge

label backing provides some information on cartridge care and the write-protect mechanism. It's hard to misuse the cartridges (they can only be inserted one way) and the door mechanism is simple, but some explanation of proper use and the meaning of the drive indicator lights would be appropriate.

### Hard Driver

The manual assumes "a basic understanding of DOS" for software installation. I would guess that the authors understand so much they've lost sight of what "basic" is. For instance, you are expected to know Edlin to create a start-up file.

There are also some goofs. In the installation instructions for DOS 1.1, you're told to copy the Bernoulli Box driver to your system disk at two different times, and the DOS 2.0 instructions do not mention setting the number of disk buffers to enhance performance. Also a note to DOS 2.1 users: configuring your system has changed from Chapter 9 in the DOS 2.0 manual to Chapter 4.

When you've completed software installation, you'll have three new files on your system disk: the Bernoulli Box driver and two utilities. The format utility initializes the eight-inch cartridges with options to provide a volume name and to analyze



the disk for defects. The duplication utility backs up the contents of one Bernoulli drive to the other (if you have two drives). You'll also have created or modified the start-up conditions on your system disk to acknowledge the new driver program.

### In Use

The cartridges slide in easily. You close the door and, four seconds later, a little green light above the door-opening button indicates the drive is ready. The red light beside it glows when the drive is accessed. The cooling fan is quiet and so are the read/write operations. They sound like rain (not a downpour) drumming on a metal roof several rooms away. Less than four seconds after pressing the open button, the door opens and you can remove the cartridge.

DOS sometimes treats the Bernoulli Box like a fixed and sometimes like a floppy disk. The hard disk Back-up and Restore commands work fine. You can back up your 10MB cartridges onto 5¼-inch floppies if you want. When you try to use the FDisk command, however, you're informed that a fixed disk doesn't exist. Although you won't be able to partition a cartridge, you can just switch cartridges if you use more than one operating system. The two utilities supplied by Iomega replace the DOS commands Diskcopy, Diskcomp and Format, which aren't supported by the Bernoulli Box driver.

I found only one minor flaw with the driver software, and it involves detection of write-protected cartridges. If a cartridge's write-protect switch is in the read-only position and you attempt to write to that cartridge directly from DOS, you're presented with the appropriate DOS error message. That message also appears appropriately with the two Bernoulli utilities. If you try to write to a write-protected cartridge from a batch file, however, there's no error message. The system hangs up for good, and if you type any key before hitting ALT-CTRL-DEL to reset, it must be powered off. This isn't a DOS error; the problem doesn't occur with write-protected disks in the 5¼-inch drives.

### Rush Performance

The Bernoulli Box put in some good qualifying times in the hard disk event. Formatting a cartridge with no options took only one second because

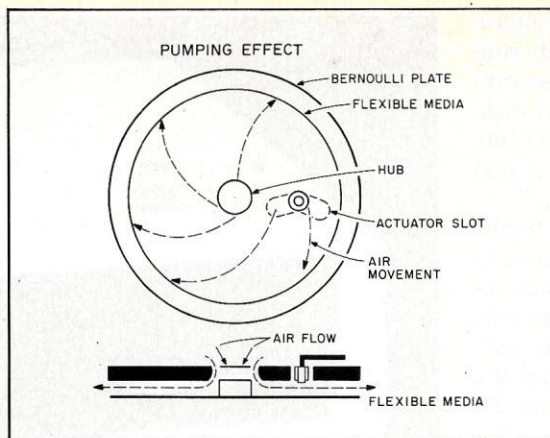


Fig. 2. Dirt on the disk surface disrupts the Bernoulli air coupling, causing the flexible disk to temporarily pull away from the head. Since there is no physical contact, permanent damage is avoided. Bernoulli air currents tend to flush particles from the system.

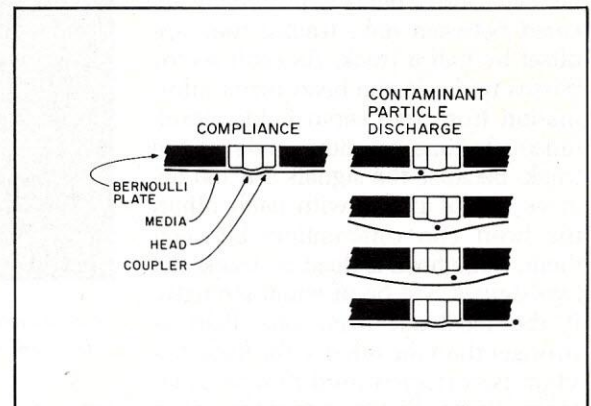


Fig. 1. Airflow in the Bernoulli Box. Air movement creates a suction that pulls the disk up.

the disks are preformatted. Using the option to check for defects, formatting took 1½ minutes. Copying DOS 2.1 plus the Iomega utilities (167,936 bytes total) from drive A to one of the Bernoulli drives took 37 seconds with the system configured for two disk buffers. With ten buffers available, the same process required 24 seconds. Selecting the verify option added about ten seconds.

The time it takes to move the contents of one Bernoulli drive over to the other with the duplication utility depends on the amount of information being copied. Backing up a cartridge with DOS and the Iomega utilities on it took only seven seconds. Back up of an almost-full cartridge (9.8MB) took four minutes.

Besides high performance, the Box promises reliability. The technology is dependably simple, and the error correction strategy is innovative. I hadn't time for a 50,000-mile test, but I did make the unit copy files from one drive to the other continuously for two hours. It didn't even work up a sweat.

### Lots of Data

The Box should appeal to people who need large amounts of storage.

Performance per dollar is good. The IBM expansion unit with 10MB drive, for instance, costs \$2880. To add another 10MB costs \$1395. That's a grand total of \$4275. Iomega gives you 20MB for \$3695 with more than comparable performance.

In addition, the removable, relatively inexpensive cartridges give the product flexibility. Like a Winchester machine, it can be used for storing original data. The low cost of the media also makes it appropriate for backups, archival storage or for loading large programs (those which require several floppy disks). There's no need to invest in disks or tape units for backups or long-term storage. The two-drive model I reviewed has, of course, more possibilities than the 10MB unit.

I can see advantages over Winchester drives, but no disadvantages. If the Bernoulli Box proves reliable, it should do well. ■

**System Requirements:** IBM PC or XT.

**Manufacturer:** Iomega Corp., 1821 W. 4000 South, Roy, UT 84067.

**Price:** 10MB unit, \$2695; 20MB, two drive unit, \$3695; cartridges, \$80 apiece.



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*Epson, a pioneer in the laptop computer market, has set a new standard for briefcase computers with its Geneva/PX-8.*





# The Geneva Correction:

## Epson Gets Its Portable Right

By Eric Grevstad  
Senior Writer

**N**ow, this is more like it. Until the Geneva/PX-8, Epson's idea of a portable was the pioneering, uninspiring HX-20—a fair keyboard and a handy microcassette for mass storage, linked to a bitsy four-line, 20-column screen and, in the Senior Technical Editor's phrase, "a Basic you could benchmark with a calendar."

The PX-8, by contrast, isn't perfect (there are a couple of major omissions I'll mention later), but it's a splendid improvement and—considering it comes with CP/M 2.2, Micro-soft Basic and MicroPro's WordStar and spreadsheet programs—a bundled bargain. The same money will buy you an Apple IIe with no software or a Sanyo MBC-550 with no monitor, but the PX-8 is arguably the most computer you can buy for \$995, portable or not.

The new Epson is particularly important because it sets a standard for affordable briefcase portables. Gavi-lan, Hewlett-Packard and others have

produced 16-bit MS DOS laptops with impressive specs but with price tags of \$3000 and up.

That's left most of the market to Tandy's TRS-80 Model 100, the machine that sank the HX-20. The 100 was last year's sensation at \$999 (now \$799), but its trim size and built-in modem didn't stop complaints about its limited 24KB RAM, 40-column display and lack of mass storage. The Geneva has 64KB RAM, an 8×80 display, a microcassette drive and more sophisticated software; Tandy will have a new portable for '85, but for now it's Epson's advantage.

### Neat and Complete

The Geneva/PX-8's two names (one for techies and one for noncomputer types) are a bit awkward, but the machine is elegantly slim; with its liquid crystal display folded down and the sliding keyboard cover in place, it's an 8½ × 11½ × 1¾-inch notebook.

The slide-out carrying handle makes





the PX-8 resemble a skinny version of those radios people carry on their shoulders; at four pounds, it probably wouldn't hurt to put it there. At first glance, the separate keyboard cover seems liable to get lost, but so could the Model 100's vinyl carrying case. The Epson looks sexier; the cased 100 might be safer in a rainstorm.

Once you push back the handle, take off the keyboard cover and swivel the prop-up feet into position, you've got an impressively engineered computer—nothing radically new, but a lean, mean implementation of the eight-bit CP/M standard. The Geneva's main CPU is a low-power CMOS Z80 running at 2.45 MHz; it surveys 64KB RAM and 32KB ROM.

A 6301 slave CPU controls video and input/output, with another 6KB of video RAM and 4KB ROM; a third

microprocessor handles keyboard and analog-to-digital housekeeping.

The unit runs on 4.8V dc, supplied either by an ac adapter/charger or the PX-8's on-board battery pack. The latter supplies up to 15 hours' worth of power before the machine shuts off and the back-up battery takes over. Recharging takes eight hours on the adapter, longer if you use the computer during that time; the Geneva won't overcharge if left plugged in. Epson claims the battery pack will last three to four years.

### Reading, Typing, Connecting

Epson couldn't do anything about LCD visibility in dim light—somewhere between crummy and pathetic—but the PX-8's eight-line, 80-column screen is otherwise one of the nicest portable displays I've seen. The characters are small (turning from the Epson to the 40-column Tandy, I felt I'd discovered Cinemascope), but quite readable.

The PX-8's screen is doubly adjustable: not only does a sliding button control contrast, but the screen tilts through six detents between vertical and horizontal. (Even the last is readable, thanks to the whole unit's slight tilt from the prop-up feet.)

The keyboard is also easy to live with. There are 72 keys, plus rather small LED lights for caps lock, insert and numeric keypad (the M, J, K, L, U, I, O, 7, 8, 9 affair found on the HX-20 and Model 100).

The arrow key layout isn't great, with down on the same row as left and right, but there are several other handy keys—a stop key (Basic break), a key to pause screen scrolling, one to freeze the window over an 8×80 portion of the virtual screen instead of following the cursor, and five shift-able function keys.

The PX-8 supports 64×640 dot-addressable graphics; some of the keys are defined for symbols such as card suits and stick figures when pressed with the number key; others can support user-defined graphics characters.



You'll never mistake the Geneva's keyboard for a desktop's—the travel's shallow and the feel's a little stiff—but it's reasonably responsive and accurate for all but the fastest typists or longest manuscripts. None of Microcomputing's testers hated it on sight; none grew to love it. My own opinion changed from neutral at first use to medium-positive with practice.

On the rear of the PX-8 are an external speaker jack, an analog-to-digital interface, an HX-20-compatible bar code reader port, a system bus interface for hardware expansion and two serial ports. The latter, called the PS-232C port and serial port, respectively, have identical miniature eight-pin connectors; the first operates at up to 19,200 bps and usually drives a printer, while the second runs at 600, 4800 or 38,400 bps (the last when connected to the optional disk drive).

The small connectors, requiring various Epson cables for various uses, are a minor annoyance, but that's nothing compared to a bigger flaw: Epson decided to build the PX-8 without a parallel printer interface. I'm tempted to call the decision unparalleled, except that Apple and IBM have done the same; nevertheless, it's inexcusable. The Geneva plugs into any of several Epson printers, but flouting the industry standard makes no sense.

### Reels Turn Slowly

Serial ports are fast, but the Epson's other I/O device is slow: the microcassette tape drive is handy for occasional back-up storage of important files, but you'll need patience if you plan to use it for daily file juggling.

One tape can hold 12 sequentially accessed files, totaling 10KB to 50KB of data on each 15-minute side of an MC-30 cassette (Epson recommends against jam-prone MC-60s). Function key control of operations like fast forward, rewind and playing (not recording) of audio tapes is available from the PX-8's system display (more on that in a moment).

Using the tape deck isn't like popping floppies in and out; blank tapes must go through a directory initialization procedure, and every tape must be mounted (its directory read into memory) and removed (its directory updated with any new files or changes) at the beginning and end of work, respectively. If you're in Basic, you can mount and remove cassettes without going to the system display;

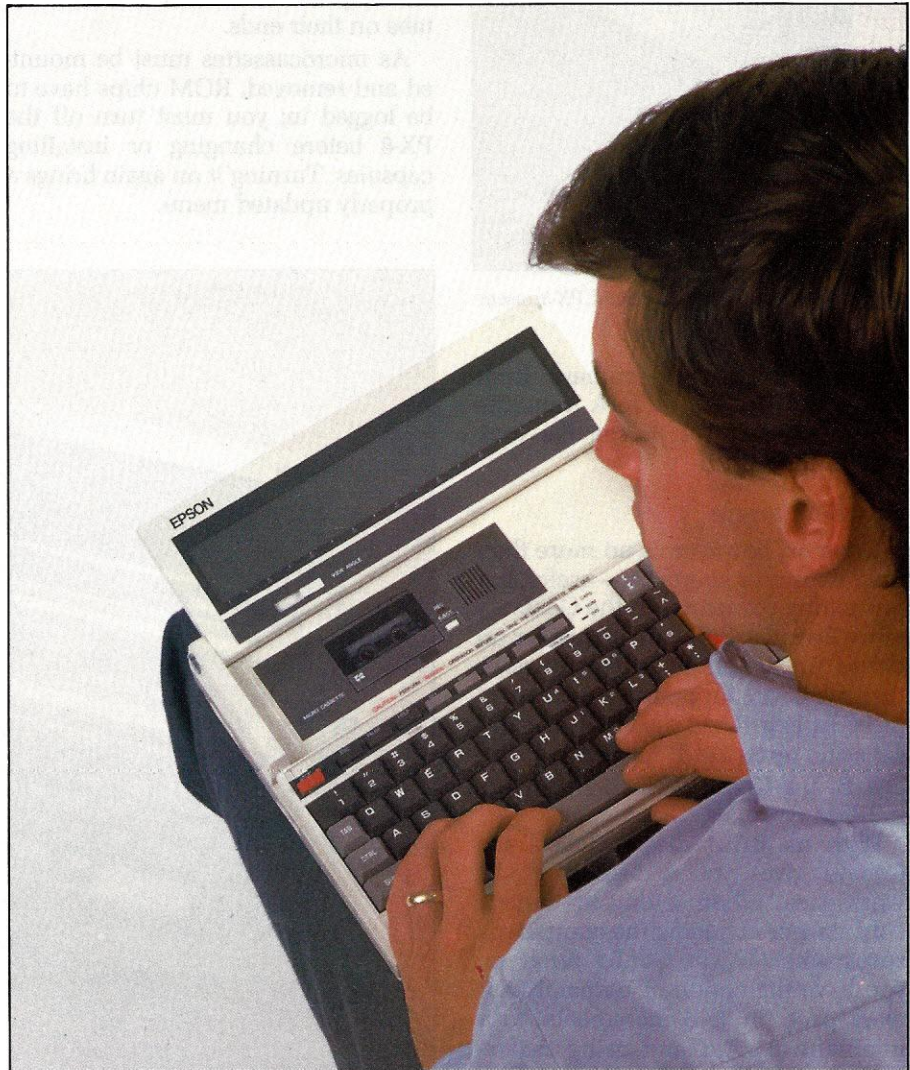
either way, each process takes about a minute.

Basic's Save and Load commands work with the microcassette, assuming you begin filenames with its drive specifier (H:), but applications programs don't. To save a WordStar file

on tape, for instance, you must save it to the Geneva's RAM disk or a micro-floppy, then use CP/M's PIP command to copy it to cassette.

That's half the reason I said the microcassette was mainly for archival storage; the other half is its reckless

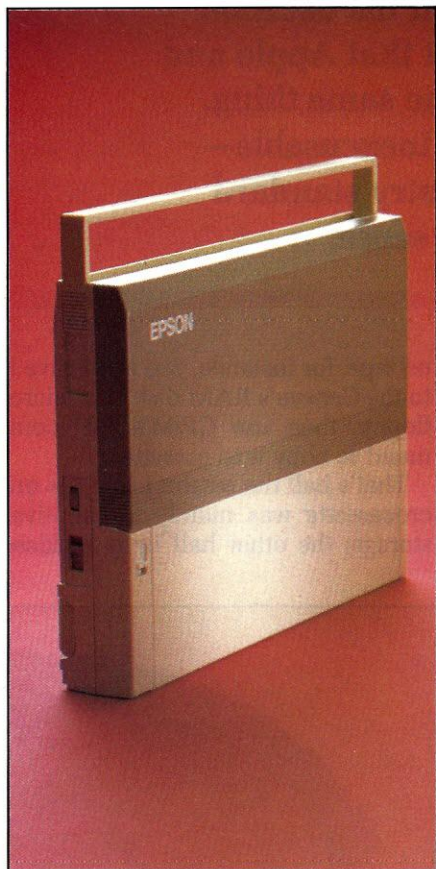
**Epson decided to build the PX-8 without a parallel printer interface. I'm tempted to call the decision unparalleled, except that Apple and IBM have done the same thing. Nevertheless, it's inexcusable—flouting the industry standard makes no sense.**



*Will the PX-8 make users forget the Model 100? It might. It is, at least, a computer that will make potential 100 users think twice.*



speed (especially in stop mode, recommended for storing WordStar files, in which the tape pauses to catch its breath every 256 bytes).



In its travel mode, the four-pound PX-8 resembles a portable radio.

Copying a 25-line document from RAM disk to drive H: took a minute and 50 seconds; a 65-line file took three minutes.

### Speedier Storage

Drive H:, however, is no more than mud flaps on a sports car—useful, but unexciting compared to the Geneva's other features. Software is quicker on drives A:, B: and C: (drive names D: through G: are for optional microfloppies). A: is a RAM disk that lets you set aside up to 24KB for fast file storage. B: and C: are 1½-inch-long, plug-in ROM capsules.

With no RAM disk installed, the Geneva gives you 63.5KB of RAM workspace. When setting up from a cold start or changing the computer's specs with CP/M's Config program, you have the option of reducing that workspace (in 1KB increments) to a minimum 39.5KB and using the remainder as drive A:. Workspace files are lost when you turn the Epson off; RAM disk files aren't.

CP/M programmers who don't mind a smaller RAM disk can set aside part of this "safe" memory as a user BIOS area, reserved in 256-byte pages or blocks. The combined RAM disk and user BIOS size must be no more than 24KB; most PX-8 owners will probably leave the latter at zero, unless they're using the Portable Scheduler program (which automatically allocates user BIOS space for appointment data).

Popping a hatch on the underside of the PX-8 and lifting the silvered flap beneath it reveals drives B: and C:, two 28-pin sockets for 32KB ROM chips. The capsules are nicely designed, sheathed in plastic so it's hard to accidentally touch their metal pins; once installed, they fit so snugly in place that you'll rip your fingers bloody trying to change them. I ignored the manual's warnings ("Do not use excessive force") and pried the capsules out with a screwdriver, levering the blade beneath the plastic tabs on their ends.

As microcassettes must be mounted and removed, ROM chips have to be logged in; you must turn off the PX-8 before changing or installing capsules. Turning it on again brings a properly updated menu.

### What's On-Screen?

The Model 100-style menu, accompanied by a discreet beep (there's a volume knob on the side) appears when you switch on the PX-8. Besides day, date and time and the size of the workspace, it shows files with specified extensions.

The default display is for .COM files on drives A:, B: and C:. For them, the arrow keys supply an operating system shell—moving the cursor to a filename and pressing the return key starts that program.

Pressing the escape key clears the screen and brings the CP/M prompt. Like the menu, a handful of CP/M 2.2 commands are part of the Epson's ROM; whichever drive you're logged onto, you'll have Dir, Era, Ren, Save, Type and User.

The Geneva's handiest ROM file appears when you press the control and help keys simultaneously: the system display, a menu that lets you specify half a dozen PX-8 defaults. It shows the day, date and time and the size of the RAM disk and user BIOS areas, and provides control of the microcassette recorder—not only function key buttons for mount, rewind and so on, but whether you wish stop mode or verification of tape saves.



The Geneva/PX-8 is a big step up from the HX-20. It features an 8×80 display, a microcassette drive, CP/M 2.2 and 64KB RAM.



## PALANTIR SOFTWARE MAKES WORD PROCESSING

# E

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# A

### ADVANCED

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# S

### SIMPLE

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# Y

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In addition, the system display lets you specify which drives and file-name extensions appear on the main menu, whether the menu or the CP/M prompt should appear at power-up and what optional autostart sequence or alarm clock settings should be. You can even set a password that users must type at start-up; intruders can push the reset switch and use the machine anyway (at the cost of erasing any RAM disk or user BIOS files), but it's a bit of executive security.

### Software to Go

The built-in commands and menus are nice, but the Epson's strength lies in its capsule software. In some ways, the ROM chip scheme is a mixed blessing: the programs are impressively powerful, but the two sockets give you access to only two of them at once. The Model 100's applications are simpler, but all of them are available all the time.

One capsule, for instance, should probably stay in the machine permanently—the CP/M utility chip, which supplements the skimpy built-in commands with the indispensable file-copying and directory-checking programs PIP and Stat.

That capsule also holds the menu-driven Config utility, used to set the automatic power-off delay, program the function keys for CP/M commands and set the date, time, RAM disk and user BIOS sizes, and RS-232C and serial speeds and default printer interface. Config even offers a choice of ASCII, Danish, British, French, German, Italian, Norwegian, Spanish or Swedish keyboard layouts.

Besides PIP, Stat and Config, the utility capsule has four other programs or commands. Submit and Xsub are used to create batch files, executing a series of commands automatically.

Term is an RS-232C communications program that lets the PX-8 send files to or capture them from another micro or act as a dumb terminal to a host computer; Filink is a more specialized version for trading files with Epson's QX-10 desktop or another PX-8. They're easy to use, if a little limited—the function keys handle commands like Send, Receive or Printer On/Off, but RS-232C settings must be changed through Config instead of the applications.

Talk of communications reminds me of another thing that's missing in



The PF-10 microfloppy supplies 278KB of formatted storage on its rechargeable battery.

addition to the parallel port: an on-board modem. You can chat with machines connected by cable or buy an acoustic phone coupler (\$120) or direct-connect unit (\$180), but Model 100 owners can embarrass Genevans by pointing out that Tandy made modems standard equipment over a year ago.

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**The PX-8 graphics commands are frankly beyond my ability—I could quibble about why you'd want fancy graphics on an 8 × 80 LCD display, but hardcore programmers should be happy.**

---

### Five Little Basics

Another ROM capsule, PX-8 Basic, is a pleasant Epson variation on Microsoft's standard. It's a good implementation, with everything you'd expect (including comparatively recent additions like while...wend) plus extras such as microcassette control instructions and function key shorthand for List, System and other keywords.

Its screen editor is a match for

some word processors and its graphics commands are frankly beyond my ability; I could quibble about why you'd really want fancy graphics and virtual screen modes on an 8×80 LCD display, but hardcore programmers should be happy.

As for speed, the Geneva performed honorably in the Basic benchmarks that embarrassed the HX-20 (*Microcomputing*, June 1984, p. 85). In a counting loop using math functions and constants, for example, the new Epson finished in 1:29, just behind the swift NEC PC-8201 and considerably faster than the HX-20's time of 2:43.

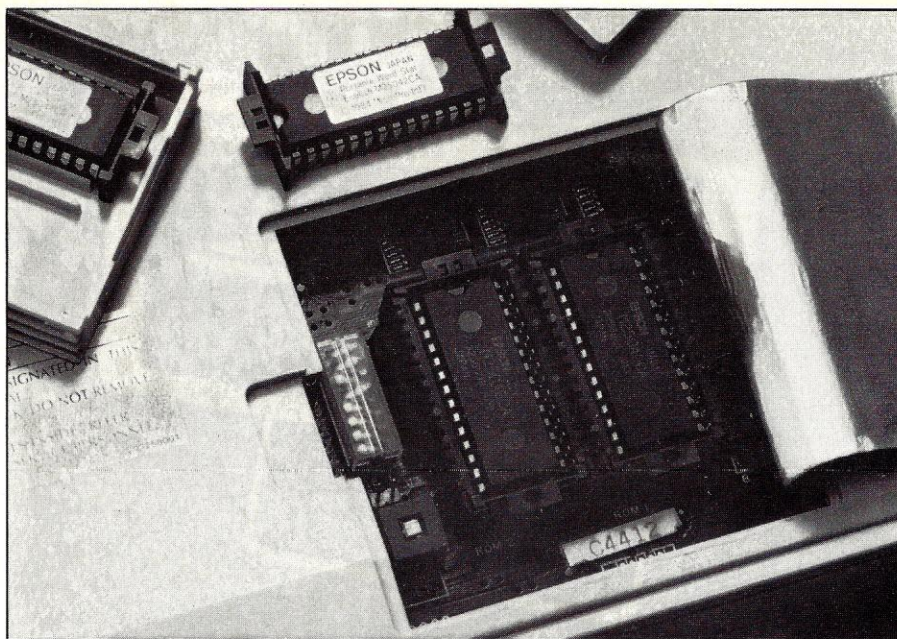
One interesting feature of PX-8 Basic is that its program area is partitioned into five segments, with a mini-menu of areas P1 through P5 appearing at start-up. You can enter any area or run one of five concurrently resident programs directly from this menu—but the programs had better be short. Even with no programs in memory and no RAM disk, the most room you'll find when starting Basic is 23,965 bytes free.

Finally, not only can five programs occupy memory at once, but Basic itself stays resident in RAM, even if you turn the computer off, until you run another application or utility. You can turn on the PX-8, press the return key from the main menu and have your programs ready and waiting.

### MicroPro's Twin Chips

Epson and Microsoft don't deserve all the software credit for the Geneva;





Bite-sized software: the Geneva's Portable WordStar and Portable Calc/Scheduler capsules, by the recessed socket that holds them.

MicroPro supplies three programs on two ROM capsules. The first, Portable Scheduler, lets you create and page through an appointment calendar, setting an alarm for individual events or seeing a whole month's engagements as a sort of bar graph. It shares a ROM chip with Portable Calc, which with the other MicroPro chip—Portable WordStar—may not rival Hewlett-Packard's choice of 1-2-3 for the 110, but certainly beats anything else an eight-bit portable has to offer.

Portable Calc is a 16,384-cell spreadsheet (up to 256 rows by 64 columns); it's hard for beginners and, subjectively, it seemed a little slow, but its range of functions and commands will satisfy anyone used to CalcStar or similar worksheets.

As for Portable WordStar, it's, well, WordStar, the only program that manages to be ageless and aging at the same time. The PX-8 version has a few nice touches (programmed function keys, Control-O-help or Control-K-help instead of big-screen versions' help menus); it lacks some gewgaws like file directories and soft hyphens, and it too feels a bit sluggish—it takes a moment to catch up after word wrapping and justifying a line, though it doesn't drop characters and the Geneva's keyboard is no race course anyway.

The eight-line display shrinks to five lines when writing (the status line and ruler take the top two, and you can't write new text on the bottom line, though you can review old

text there), but Portable WordStar is the most complete mailbox-slot word processor on the market. It'll probably be the PX-8's biggest selling point; I doubt it'll charm beginners any more than desktop WordStar does, but those used to the standard will feel right at home.

#### Expanding the PX-8

If a 24KB RAM disk and a slow cassette deck aren't enough, Epson offers two ways to upgrade the PX-8's storage capacity. One is an inch-thick external RAM disk that plugs into the system bus and screws onto the Geneva's bottom (rendering the tilting feet obsolete); once installed, it overrides the internal RAM disk, giving you a full 63.5KB workspace and a drive A: of 60KB (\$329) or 120KB (\$460).

I tested the 120KB unit, which installed easily (though I had to start cold, wiping out my old A: files, to make the PX-8 recognize it). Except for making the machine noticeably heavier, it worked like a charm; I particularly appreciated the external disk's back-up power supply and convenient write-protect switch.

A more conventional storage space is the PF-10 (no, it's not also called the Zurich or anything), a 3½-inch microfloppy drive that costs \$599. The size and about half the weight of a brick, the PF-10 connects to the Geneva's serial port, which sets itself to 38,400 bps to accommodate it. It uses the same ac adapter/charger, and according to Epson runs for 90 minutes

(with one read/write access every two minutes) on a battery charge.

Though it uses double-sided disks, the unit packs less into 3½ inches than the more complex single-sided drive in Apple's Macintosh: 320KB by Epson's press release, 278KB free on a blank microfloppy I formatted. It is, however, fast enough to make microcassette users take out \$599 loans—as drive D:, it loaded an 80-line text file in 15 seconds.

Two drives can be chained together, which would speed up another matter considerably: with one drive, making back-up disks takes forever. One of the programs supplied on the PF-10 system master, Copydisk, is an easy menu-driven utility (you can format disks, copy the DOS or an entire disk or both), but backing up the system master takes 20 minutes, 20 cycles of swapping the original and new disks back and forth to read or write two tracks at a time. And that's after formatting the new disk.

Still, the PF-10 will appeal not only to former cassette users but to those who want to get the most from the Geneva as a CP/M machine. Beside the seven transient CP/M utilities (the disk's Config 1.2 seemed identical to the ROM capsule's 1.0), the system master contains the serious programming utilities DDT, Ed, ASM, Load and Promform—the last, when blank capsules become available, will let you transfer new programs to them—as well as Copydisk. Above all, the battery-powered drive seems rugged and reliable.

#### The Limits to Growth

Buying one of the mass storage options, however, won't solve the problem of three or four desirable programs and only two ROM sockets. Even with, say, the 120KB RAM disk installed and PIP ready to go, Epson and MicroPro stymie you with protected software: Portable WordStar and Calc won't work when copied onto a RAM disk or floppy.

The CP/M utilities will work, so you can PIP PIP onto your RAM disk, and copied Basic seems to run, though the manual advises against it. (To compare the PF-10 microfloppy to a ROM chip, by the way, the two devices load Basic in 47 and 12 seconds, respectively.) But, for the most part, you'll have to finish working with one program, fetch your screwdriver and replace that ROM



chip with another.

### More Advanced Than Its Users?

Software protection and no parallel port, then, are two serious problems that no option will solve. The Geneva's third major flaw, the lack of a modem, can be remedied either with the separate acoustic or direct-connect units or what sounds like the best option in the catalog: a bottom-panel "multi-unit" that combines a 60KB RAM disk with a direct-connect modem. Priced at \$360, substantially less than an expansion RAM disk and modem bought separately, this product (due in mid-August) is one I want to see.

What's most appealing is the prospect of a PX-8, the 60KB RAM disk and modem unit, and a PF-10 disk drive—a desktop-caliber system that fits in a briefcase and runs on batteries, for a total price of less than \$2000. Except for a video interface to drive a full-sized monitor, that would be all the computer most of us would ever need.

In some ways, actually, the PX-8

may be more computer than many of its prospective buyers need. Both the Epson and MicroPro manuals are excellent, clearly organized and thoroughly cross-referenced (the Portable WordStar manual, in fact, is a revision of the generally applauded WordStar 3.3 manual with the cartoons redrawn), but no one ever described WordStar as the novice's friend.

And I doubt Mr. Mobile Nontech Executive, who admittedly may not need the power and complexity of MS DOS laptops like the Gavilan, will rejoice at the tricky commands and backwards syntax of CP/M. (Extending the menu or shell concept further to help with things like PIP and Stat would be invaluable.) Similarly, the whole idea of a bells-and-whistles Basic on a nonprogrammer's small-screened machine strikes me as odd.

This may be why I have, ultimately, one reservation about the Geneva/PX-8: the Tandy 100, with its simpler word processor and built-in modem, is perhaps a better note taking and telecommunications machine. But

there's no doubt the Epson is a better portable computer. To give it the highest praise our office poll could think of, it's the first portable we'd definitely consider buying instead of a Model 100.

With solid technology at a dynamite price, it's raised the ante in an entire product category. I never thought I'd describe a Z80 CP/M machine as innovative again. ■

### A Capsule Look: PX-8

**Manufacturer:** Epson America Inc., 3415 Kashiwa St., Torrance, CA 90505.

**Price:** \$995 (with 64KB RAM, 32KB ROM, microcassette drive, RAM disk capability, RS-232C serial port, high-speed serial port, ac adapter/charger).

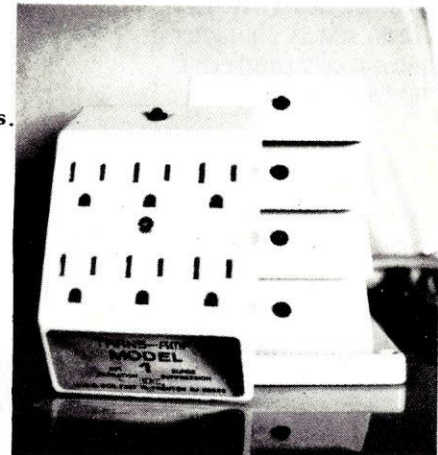
**Software:** 32KB ROM capsules for CP/M 2.2 utilities; Basic; WordStar; Calc/Scheduler.

**Options:** 3½-inch disk drive (\$599); 60KB RAM disk unit (\$329); 60KB RAM disk unit with direct-connect modem (\$360); 120KB RAM disk unit (\$460); direct-connect modem (\$180); acoustic coupler modem (\$120); 80-column thermal printer (\$275).

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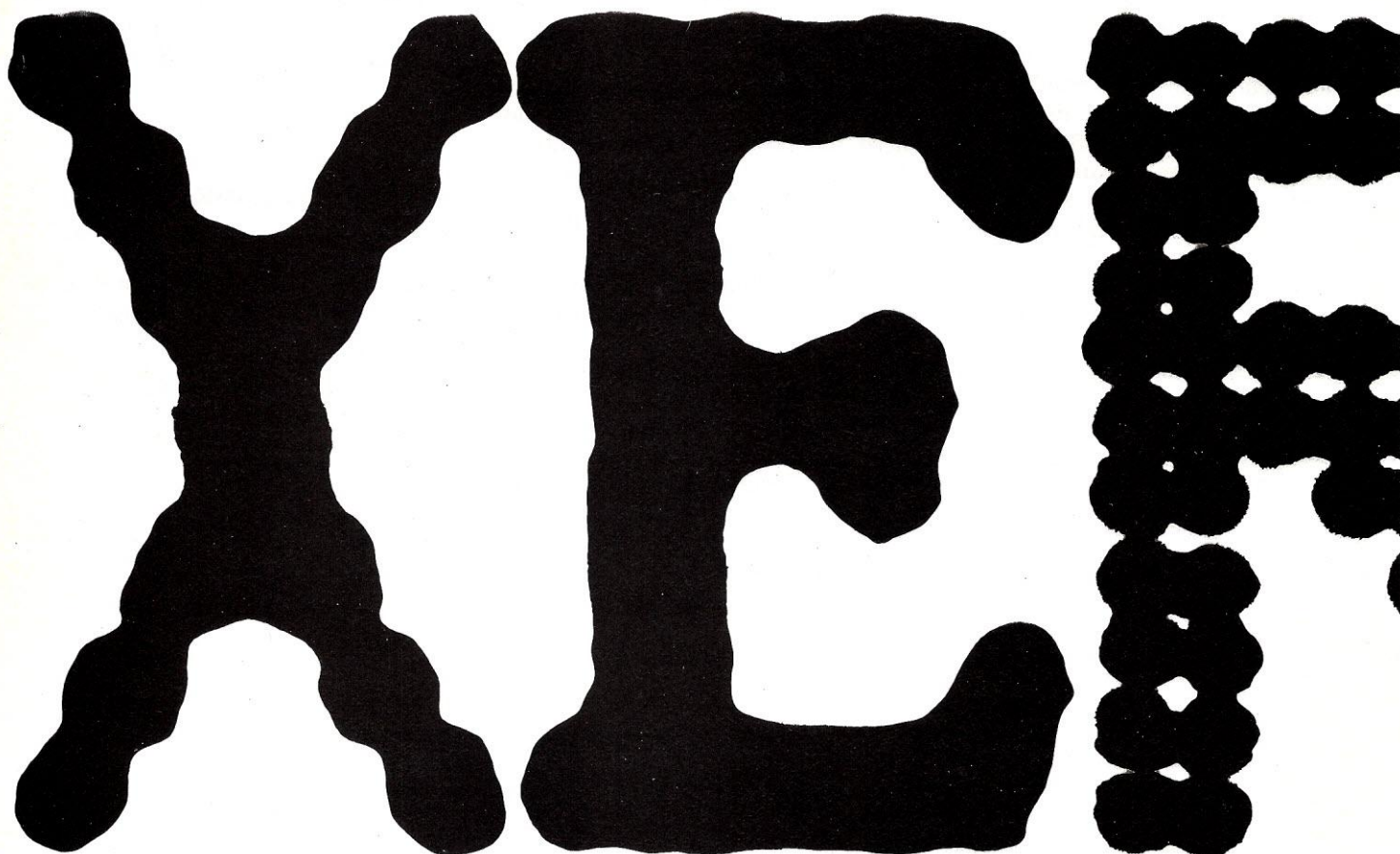
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\*Source: Datamation Magazine 1983 Brand Preference Study of printer preference by end users and OEM's.

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# Logitech's New Breed of Modula

# 2

By Edward Joyce

**A** computer language grows like a tree. The first sign of life is a barely perceptible seedling in the fertile mind of a computer scientist. After a gestation period that varies according to species, the seed sprouts on a particular hardware landscape. As the sapling matures, predominant characteristics form, distinguishing the new breed from the variety of other flora teeming in the forest. Depending on its ability to adapt to the terrain and climate and its attractiveness to those creatures called users, the language either flourishes and spreads across a wide spectrum of hardware—or stagnates and eventually succumbs within the restricted environment of a single machine.

## A Tree Grows

The computer language Modula-2 is following this pattern. It germinated in the fertile mind of Niklaus Wirth at the Swiss Federal Institute of Technology. Before Modula-2 eventually sprouted on a PDP-11 computer, the seed gestated for ten years while Wirth studied the shortcomings of his previous contribution to computer botany, Pascal.

Modula-2 in its maturity distinguishes itself from the cornucopia of other computer dialects by distilling the elegance of structured programming, embodying constructs for machine level access and offering independent compilation of modules and library routines. Versions sold by several vendors for the Apple II, Sage IV and IBM PC attest to the language's adaptability.

Today Modula-2 is attracting a sol-

id following among computing enthusiasts and language connoisseurs. Will it become the predominant language by the end of the decade, mirroring Pascal's rise in popularity in the 1970s? Or will it wane in the face of stiff competition from Ada, C and the pervasive Basic? The answers to these questions depend largely on products like the Modula-2/86 system from Logitech Inc.

The key to the success of a language in the 1980s is its ability to mesh with the ever popular MS DOS and CP/M-86 16-bit environments. Programmers need high-level languages for developing applications software for the IBM PC and its 45-odd clones. But in addition to compatibility with MS DOS and CP/M-86, the language must produce programs that execute quickly without putting extravagant demands on memory.

## \$64 Question

Logitech's system warrants attention because it's the first Modula-2 compiler that generates 8086 native code for MS DOS and CP/M-86. The \$495 package includes a compiler, linker, symbolic debugger and module library. Logitech bills it as a "professional development system for programming 8086/8088-based microcomputers."

Does the debut of native code Modula-2 mean you'll be able to retire your Pascal, C and Fortran compilers? Let's dissect the product piece by piece and weigh the merits of the individual components before answering that \$64 question.

The system is distributed on three double-sided, double-density disks labeled system, compiler and linker/debugger. The system disk contains run-time support, installation files and hardware customization modules, including drivers for tailoring the terminal keyboard and display. The installation procedure is straightforward and hardware customization is unnecessary on IBM PC and PC-compatible machines. For example, the Columbia VP computer on which I tested the software required only five minutes for installation and setup.

The other two disks house the four-pass compiler, linker and symbolic post-mortem debugger. On systems without a hard disk, a fourth disk, called a work disk, is required for the system editor, source code files and sundry utility programs.

Since my system lacks a hard disk, I was stuck with operating the software from four floppies, not the most desirable situation. To pare down the assortment of floppy media, I tried to combine the distribution files spread over three disks. But, alas, the CHKDSK command tallies the files on the distribution disks at 269KB, 346KB and 326KB, which doesn't leave much room to spare considering that the total capacity of each disk is 354KB.

You can put away the system disk once the software is installed. The work disk is left in drive A and the compiler or linker/debugger disk is put in drive B, depending on the operation. The bottom line is that compiling and linking a program requires a



***Will Modula-2 be the language of the 80s? The competition is stiff and whether or not Modula-2 achieves predominance as a language depends on the success of products like Logitech Inc.'s Modula-2/86—the first Modula-2 compiler that generates 8086 native code for MS DOS and CP/M-86.***

disk swap. If you're willing to forgo parts of the extensive library support provided, you might shoehorn the core compiler and linker files on one disk.

A hard disk, of course, alleviates this hassle. Logitech recognizes the inconvenience of running the software on a floppy-based system. Its product brochures state in black and white, "We recommend a hard disk." Squeezing the system on less than the three distribution disks would decrease the robustness of the software. Personally, I prefer the full implementation even though that requires disk swapping. Then again, most professional programmers will probably have access to a hard disk, which eliminates the problem completely.

The software's demands on storage space extend to main memory, too. The system requires 256KB to compile and link programs. Expanded memory beyond 256KB does not affect performance. The object code produced after compilation and linking may be executed on any processor with adequate memory.

For example, the object code for the Sieve of Eratosthenes benchmark program occupies 19KB. Coupled with the run-time support module, which measures a tad shy of 8KB, the Sieve program requirements total 27KB. Hence, while you require a processor with 256KB to compile and link the Sieve program, a processor with as little as 27KB of user memory executes it.

Incidentally, Logitech's first printings of product literature and documentation incorrectly listed the com-

piler memory requirement as 192KB. If you come across this figure, it's a misprint—it should be 256KB.

#### **Pegging Performance**

Obviously, the software likes plenty of elbow room in memory. The next question is, what does this sea of RAM do for performance? To draw a comparison between this product and other compilers, I ran it through the customary Sieve benchmark on a Columbia VP computer under MS DOS 2.0. The Columbia hosts an 8088 microprocessor running at 4.77 MHz. Table 1 shows the results of the Sieve benchmark that performs ten iterations of calculating the 1899

prime numbers between three and 16,381.

Execution clocks in at a respectable 16 seconds and compares favorably with Computer Innovations' C compiler and Softech's UCSD native code Pascal compiler, which run the benchmark in 17.4 and 20 seconds, respectively.

The second benchmark in Table 1 shows the results of executing the Sieve program with subrange, index, arithmetic and stack overflow tests enabled. Normally, Modula-2 generates code that tests these items during program execution to prevent programming bugs from wreaking havoc. If an invalid condition is

Benchmark	Execution Time	Compilation Time	Compilation Time w/List	Object File Size-Bytes
Sieve without overflow tests	16	334	364	18,970
Sieve with overflow tests	19	334	364	19,050

Table 1. Results of executing Sieve of Eratosthenes prime number algorithm in Logitech's Modula-2. All times are given in seconds for a Columbia VP with 256KB of RAM and dual 360KB floppy disks. The compilation times were measured with and without generating a listing file. Object file sizes don't reflect the 8KB run-time package also required to execute the program.



detected—an integer exceeds its upper bound of 32,767—then the program is terminated and an error message is displayed. These tests, of course, entail a certain amount of overhead and are normally disabled when executing the Sieve benchmark to allow a fair comparison with languages that don't make these checks. When the tests are enabled, they increase execution time by about 19 percent.

Although this system zips along during execution, it loses its head of steam during compilation. The Sieve benchmark grinds over the finish line in 334 seconds after compiling and linking.

At first glance, compilation and link speeds appear inordinately slow. There are, however, valid reasons that account for the long times. First, Logitech's product implements 100

## Link times may appear inordinately slow, but there are valid reasons—Logitech implements 100 percent of the sacred Modula-2 standard.

percent of the sacred Modula-2 standard defined by Wirth. No restrictions, limitations or exceptions apply. Forward references, overflow tests and other standard features deleted from some Modula-2 implementations are alive and well in Logitech's system.

Second, the system supports the

full working model of the 8086 microprocessor. This means that up to one megabyte of code and data may be accessed. Furthermore, a program may be comprised of up to 100 modules or 2000 procedures, a generous allotment.

### Robust Features

Reviews of many language products stop after a discussion of execution and compilation performance. With Logitech's Modula-2, you've just crossed the halfway line. The system offers a full selection of features that augment plain code generation. Among the most noteworthy are overlays, 8087 support, an assembler interface, a debugger and a module library.

The overlay scheme dynamically loads subprograms into unallocated memory. The subprogram is then ex-

Table 2. Logitech's Modula-2/86 system offers a module library of more than 150 procedures, most of which are listed here.

Module/Procedure	Description	Module/Procedure	Description
<b>ASCII</b>	Supplies constants for nonprinting characters	<b>Again</b>	Return character to buffer to be read again
<b>Cardinal/I/O</b>	Read/write CARDINAL numbers at terminal	<b>SetRead</b>	Set file in reading state
<b>Read Cardinal</b>	Read unsigned decimal number	<b>SetWrite</b>	Set file in writing state
<b>WriteCardinal</b>	Write unsigned decimal number	<b>SetModify</b>	Set file in modifying state
<b>ReadHex</b>	Read hexadecimal number	<b>SetOpen</b>	Set file in open state
<b>WriteHex</b>	Write hexadecimal number	<b>Reset</b>	Set file in open state and position to top
<b>Conversions</b>	Convert INTEGER and CARDINAL to string	<b>SetPos</b>	Set current position in file
<b>ConvertOctal</b>	Convert number to octal string	<b>GetPos</b>	Get current position in file
<b>ConvertHex</b>	Convert number to hexadecimal string	<b>Length</b>	Return file length in bytes
<b>ConvertCardinal</b>	Convert number to decimal string	<b>Doio</b>	Do file read/write operation
<b>DiskDirectory</b>	Interface to directory functions	<b>Filename</b>	Check for legal file name
<b>CurrentDrive</b>	Return current default drive	<b>InOut</b>	Perform standard high-level formatted I/O
<b>SelectDrive</b>	Set default drive	<b>OpenInput</b>	Accept file name from terminal and open for input
<b>CurrentDirectory</b>	Get current directory for specified drive	<b>OpenOutput</b>	Accept file name from terminal and open for output
<b>ChangeDirectory</b>	Set current directory	<b>CloseInput</b>	Close input file
<b>MakeDir</b>	Create subdirectory	<b>CloseOutput</b>	Close output file
<b>RemoveDir</b>	Remove subdirectory	<b>Read</b>	Read character from current input
<b>ResetDiskSys</b>	Reset disk	<b>ReadString</b>	Read string from current input
<b>Display</b>	Display on terminal	<b>ReadInt</b>	Read INTEGER from current input
<b>Write</b>	Display character on terminal	<b>ReadCard</b>	Read CARDINAL from current input
<b>FileMessage</b>	Write file status/response on terminal	<b>ReadWrd</b>	Read WORD from current input
<b>WriteResponse</b>	Write description of FileSystem response	<b>Write</b>	Write character to current output
<b>FileNames</b>	Read file specification from terminal	<b>WriteLn</b>	Write new line to current output
<b>ReadFileName</b>	Read file specification from terminal	<b>WriteString</b>	Write string to current output
<b>FileSystem</b>	Manipulate files	<b>WriteInt</b>	Write INTEGER to current output
<b>Create</b>	Create temporary file	<b>WriteCard</b>	Write CARDINAL in decimal to current output
<b>Close</b>	Close file	<b>WriteOct</b>	Write CARDINAL in octal to current output
<b>Lookup</b>	Look for file on specified drive	<b>WriteHex</b>	Write CARDINAL in hexadecimal to current output
<b>Rename</b>	Rename file	<b>WriteWrd</b>	Write WORD to current output
<b>Delete</b>	Delete file	<b>Keyboard</b>	Perform keyboard input
<b>ReadWord</b>	Read WORD from file	<b>Read</b>	Read character from keyboard
<b>WriteWord</b>	Write WORD to file	<b>KeyPressed</b>	Test if character available
<b>ReadChar</b>	Read character from file	<b>MathLib0</b>	Perform real math functions
<b>WriteChar</b>	Write character to file	<b>sqrt</b>	Calculate square root
<b>ReadByte</b>	Read byte from file	<b>exp</b>	Calculate natural exponentiation
<b>WriteByte</b>	Write byte to file	<b>ln</b>	Calculate natural logarithm
<b>ReadNBytes</b>	Read specified number of bytes from file	<b>sin</b>	Calculate sine
<b>WriteNBytes</b>	Write specified number of bytes to file	<b>cos</b>	Calculate cosine



ecuted, and afterwards control is returned to the calling program, at which time the subprogram's memory is deallocated.

The 8087 numeric coprocessor is called upon for floating point arithmetic. While this is undoubtedly faster than calculating real numbers with software subroutines, it scores no points with the legions of 8086/8088 system owners who haven't invested in the luxury of an 8087. Logitech plans to fill this gap by providing software emulation of floating-point arithmetic in the next release, scheduled for the fall of 1984.

Another feature straddling the fence that separates advantages from disadvantages is support of MS DOS version 2.0 directory structure. In itself, this rates a gold star since many software products have yet to support 2.0 directories.

## Despite the convenience of the debugger, I found several areas ripe for improvement. Fortunately, Logitech is already hard at work...

The down side, however, is that the system compiler and the object code files created won't even run under MS DOS 1.1 or 1.25. According to Logitech, this limitation will be corrected with a special version of Modula-2 targeted for MS DOS 1.1. That version should be available by this

time. Those who've purchased the 2.0 version can obtain the 1.1 version for \$395.

The system's assembler interface meshes Modula-2 programs with programs written in assembler or high-level languages. Since Modula-2 with its low-level access to the hardware will perform any operation that can be executed in assembly language, including I/O drivers, there's no need to supplement Modula-2 programs with special routines written in assembler. This interface capability does, however, allow you to incorporate software previously written in other languages into Modula-2 programs.

### Bugs, Adieu

One of the strongest assets of Logitech's Modula-2 is the debugger. When a program stops because a Modula-2 Halt statement is executed

Module/Procedure	Description	Module/Procedure	Description
arctan	Calculate arc tangent	WriteRealOct	Write REAL octal number to terminal
real	Convert INTEGER to REAL	<b>Storage</b>	Manage dynamic storage
entier	Extract INTEGER part of REAL number	ALLOCATE	Allocate storage in specified number of bytes
<b>NumberConversion</b>	Convert between numbers and strings	DEALLOCATE	Deallocate storage
StringToCard	Convert string to CARDINAL number	Available	Test whether number of bytes are available
StringToInt	Convert string to INTEGER number	<b>Strings</b>	Handle variable length strings
StringToNum	Convert string of any base to CARDINAL number	Assign	Move source string to destination string
CardToString	Convert CARDINAL number to string	Insert	Insert substring into string
IntToString	Convert INTEGER number to string	Delete	Delete characters from string
NumToString	Convert number of any base to string	Pos	Return index into string of specified substring
<b>Options</b>	Read file specifications with options	Copy	Copy characters from string
FileNameAndOptions	Read specifications and options from terminal	Concat	Concatenate two strings
GetOption	Get another option	Length	Return number of characters in string
<b>Processes</b>	Set up pseudoconcurrent processes	CompareStr	Compare two strings
StartProcess	Start new process	<b>System</b>	Perform system-dependent functions
Send	Send signal	Terminate	Terminate subprogram
Wait	Wait for other process to send signal	GetTime	Return current date and time
Awaited	Test whether any other process is waiting	SetTime	Set current date and time
Init	Initialize signal object	TermProcedure	Declare termination procedure
<b>ProgMessage</b>	Write program status message on terminal	CallTermProc	Call all termination procedures for program
WriteStatus	Write program status message on terminal	InitProcedure	Declare initialization procedure
<b>Program</b>	Interface with subprograms	CallInitProc	Call all initialization procedures for program
GetErrorInfo	Obtain information about load error	DOSCALL	Invoke operating system function
Call	Load and execute subprogram	<b>TermBase</b>	Perform terminal I/O with redirection
<b>RS-232Code</b>	Perform high-speed interrupt-driven serial I/O	AssignRead	Install read and status procedures
Init	Initialize serial port	AssignWrite	Install write procedure
StartReading	Allow characters to be received from serial port	UnAssignRead	Disable last AssignRead
StopReading	Disable receiving from serial port	UnAssignWrite	Disable last AssignWrite
BusyRead	Read character from serial port if available	Read	Read character
Read	Wait and read character from serial port	KeyPressed	Test if character available
Write	Write character to serial port	Write	Write character
<b>RS-232Polling</b>	Perform polled serial I/O	<b>Terminal</b>	Perform terminal I/O
Init	Initialize serial port	Read	Read character from terminal
BusyRead	Read character from serial port if available	KeyPressed	Test if character available from terminal
Read	Wait and read character from serial port	ReadAgain	Make last character be re-read
Write	Write character to serial port	ReadString	Read string from terminal
<b>RealInOut</b>	Perform REAL I/O at terminal	Write	Write character to terminal
ReadReal	Read REAL number from terminal	WriteString	Write string to terminal
WriteReal	Write REAL number to terminal	WriteLn	Write new-line to terminal



or a run-time error is encountered, a memory image is dumped to a disk file. The symbolic debugger can then be used to inspect the disk file and perform an autopsy on the deceased program.

The debugger works with a reference file optionally created for the program by the compiler. Four different types of information are displayed: process, data, memory and text. The displays or windows, as they're referred to in the documentation, are displayed in scroll mode. The process window shows the state and call chain of the procedure that generated the memory dump.

The data window shows the data variables of the last selected procedure or module. Individual elements of arrays may be selected for display along with variable addresses. The data window is typically used in conjunction with the memory window, which lists the contents of memory around a selectable address. The memory contents may be depicted in eight different formats, including hexadecimal and ASCII text.

Finally, the text window points to the actual statement in the source code that caused the dump, leaving no question as to who the culprit was.

Despite the convenience of the debugger, my computerphile personality found several areas ripe for improvement. Wouldn't it be nice if the debugger operated interactively, providing a real-time, single-step trace instead of a post-mortem dump? Simultaneous display of the windows in split screen mode also ranked high on my wish list. Fortunately, the software jocks at Logitech are already working on these enhancements. According to technical representative Chris Cale, the improvements should surface in a future release, which existing customers will be able to purchase for a nominal fee.

### Super Selling Point

Considering the power of the debugger, you begin to appreciate why the software occupies three disks and commands a hefty \$495 price. The other section of the system that accounts for a significant share of disk space and dollar investment is the module library. Logitech supplies the standard library modules defined by Wirth, namely, modules for terminal and file I/O and routine math functions. The company then augments this core with a smorgasbord of other

modules that embody more than 150 procedures.

The expanded module library runs the gamut of applications, from RS-232C communications to string manipulation to direct DOS function calls. Table 2 lists the module procedures and their descriptions.

Programmers who write code that dips into the underlying operating system will relish the DOSCall procedure of the system module. DOSCall interfaces directly with any of the MS DOS 2.0 service calls, such as random block read or create subdirectory. Returned parameters are passed back through Modula-2 Word and Address variables.

Perry Greiner of the Greiner Organization, an insurance firm in Palo Alto, CA, cites this feature as one of the reasons he picked Logitech's Modula-2 to write a custom database. "I considered writing the program in PL/I," says Greiner, "but that language had no elegant way of accessing the screen buffer. I deal with the buffer directly for quick manipulation of data and screen attributes. Modula-2's machine-level access is a super selling point."

Although Greiner is generally satisfied with the product, he regrets the lack of a language tutorial. To document the software, Logitech delivers Niklaus Wirth's book *Programming in Modula-2* and a 200-page user's manual. Both the book and the manual are oriented to the experienced programmer. Familiarity with Pascal will help immensely in understanding the material. If your only previous language is Basic and you're forced to rely on this documentation as your sole guide, then the learning curve will be much longer.

Besides wanting a language tutorial, the user's manual could stand some polish and fine editing. The sparse index let me down more often than not and some references in the table of contents miss their mark by a page or two. On the whole, though, the manual does a good job, especially considering it's a first release.

### Profuse Proliferation

Overall, Logitech has cultivated a new breed of Modula-2 targeted primarily at professional software developers. The open royalty/license agreement underscores this fact. As the company puts it, software developers have "a royalty-free license on the use or resale of code generated by the

Modula-2/86 system or on code provided as linkable library modules [run-time library]." Certainly, this policy will help to entrench Modula-2 in the tool chests of programmers.

What can we expect from Logitech regarding future Modula-2 developments? Again pointing to its commitment to professional programmers, the company alludes to an integral text editor and a VAX-hosted, 8086 cross compiler in addition to the interactive debugger mentioned previously. The text editor will check language syntax as source code is entered, and it will also interface with the debugger for efficient edit, compile and test sequences. The cross compiler will generate 8086 code in the fast environment of a DEC VAX minicomputer.

The debut of native code Modula-2 for the ubiquitous 8086 microprocessor marks a milestone in the growth of the language. Wirth's brainchild has spread beyond the hardware landscape of its infancy. Industry sages expect Modula-2 to proliferate profusely in the thickets and woodlands dominated by Pascal since they both stem from the same rootstock. From that point, it will probably only be a matter of time before Modula-2 dominates the rest of the forest, too. ■

Address correspondence to Edward Joyce, Route 9, Box 149, Charlottesville, VA 22901.

### A Capsule Look At Logitech's Modula-2

#### Manufacturer

Logitech Inc., 805 Veterans Blvd., Redwood City, CA 94063.

#### Price

\$495.

#### System Requirements

8086 or 8088 microcomputer running MS DOS or CP/M-86; 256KB RAM; 600KB disk storage.

#### Standard Features

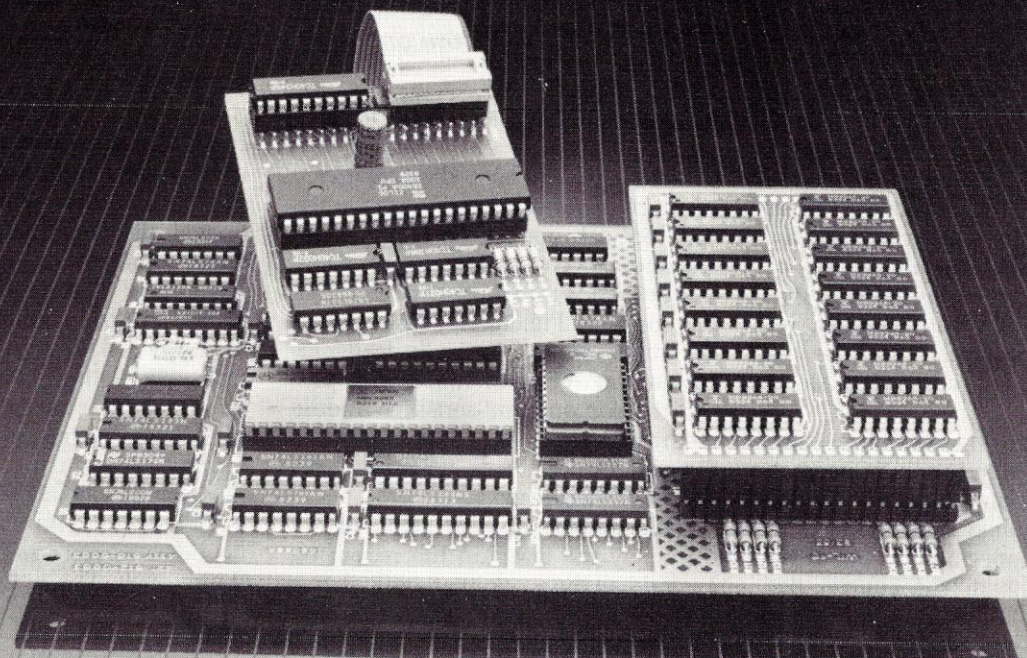
Modula-2 native code compiler; symbolic debugger; 8087 numeric coprocessor support; overlay support; assembler interface; module library with more than 150 procedures.

#### Documentation

200-page user's manual; *Programming in Modula-2* by Niklaus Wirth (Springer-Verlag).



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# Laser Disks - No Optical

*Optical disks have brought new meaning to the phrase mass storage. These products of laser technology can store from one to five gigabytes of data.*

By Joseph Rotello, Jr.

**E**ven with the introduction of microfilm, documentation numbering systems and other storage and retrieval schemes, the modern day office is still bound by the paper goods that are its lifeblood. Invoices, letters, receipts, contracts and the like are necessities of current business practice.

Although we've been presented with a storage solution in the form of the office computer, even the desktop personal computer hasn't replaced the reams of paper and arrays of file cabinets that form the central nervous system of an entire company.

Today's floppy and hard disk computer storage environments simply can't keep pace with office paperwork and expanding files.

## Technology Marches On

Recent technology and new product plans herald a new and far more expansive information storage and retrieval medium. A new type of computer memory storage device, termed the optical disk drive, is coming out of the computer laboratory and into the office. This marvel of optical science married to computers stands to revolutionize existing offices and make a definite dent in data storage/retrieval problems.

Current optical disk offerings use laser technology integrated with computer electronics. Simply stated, a carefully controlled low-power laser beam both reads and writes computer data onto a specially made plastic-coated aluminum disk. This coupling of electronics and laser optics allows for recording densities (i.e., the ability to pack more data into a smaller space) that are an embarrassment to current PC floppy and hard disk technology.

The optical disk recording medium

is similar to the hard disk magnetic medium in outward appearance only. The optical disk is generally constructed of a rigid layered or sandwiched polymer/aluminum disk medium (see Fig. 1). The disk is coated with a special optically transparent outer covering or substrate to protect the contaminant-sensitive middle recording layer. The laser beam is focused through this covering onto the recording layer.

The minute physical changes induced by the laser on the recording layer do all the work in an optical disk system. In fact, you need a microscope in order to see these changes in the recording layer, which define if data has been recorded to the optical disk or not. These changes are generally seen as micron-sized bubbles in the recording surface, created by the heat action of the laser.

In order to read the previously written data, the laser simply scans the recording surface and detects the bubbles' reflectance as valid data to be read and converted back into computer information.

The other part of the optical disk system, the electronics that interface with and communicate to and from the computer system, is itself an association of lasers, optical mirrors and prisms along with the circuitry required to convert the laser light beams into digital signals that can be understood by the computer system (see Fig. 2).

In order to protect the sensitive and valuable optical disk, most manufacturers enclose the disk in a protective cartridge that allows the optical disk platter to be loaded or removed from the disk drive safely and easily.

## Lots of Storage

A new recording technology is only part of this computer storage ad-

vancement story. The real benefits to the office PC user lie in the impact the optical disk will have in the everyday office routine.

A look at Table 1 gives you an idea of the comparative storage densities of floppy disks, hard disks and optical disks. Note that I've translated the mumbo-jumbo of high technology into practical terms in regard to how much information each storage medium can hold. You can store up to 2500 times as much data on one optical disk as you can on one common floppy disk. The optical disk bottom line is a simple one: storage and lots of it.

Just when you're used to hard disk terminology where storage specifications of ten to 40MB are common, along come optical disks that store from one to five gigabytes (one gigabyte equals one billion bytes). Each byte, of course, is roughly equivalent to one character or letter.

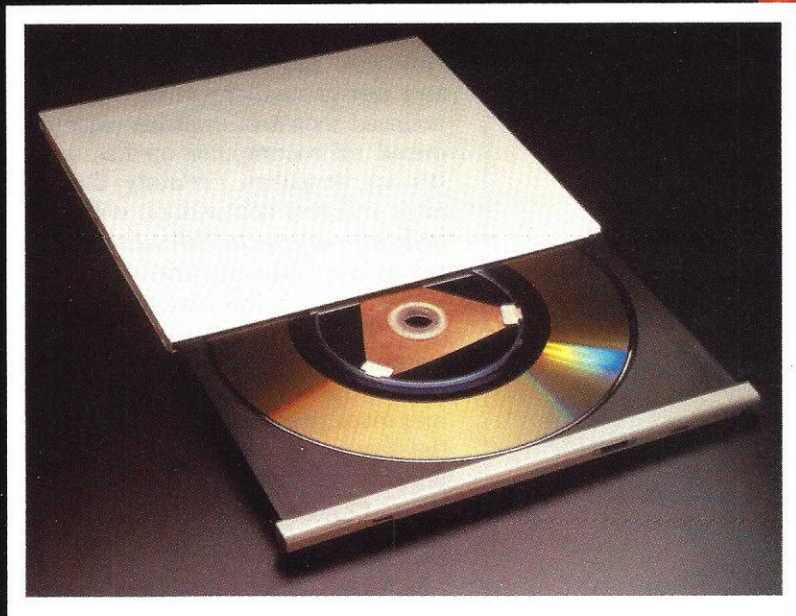
## Cost Reduction

Using the optical disk as a storage medium also has the effect of driving down the cost of information storage per page. Even if you include the initial outlay (or capital expense) required to procure an optical disk at current preproduction pricing, the per-page operating and storage cost of the optical disk is at or near that of the standard paper office (see Table 2).

Like the proverbial iceberg, one of the biggest contributions of optical disks lies below the observable surface. The inherent high storage capacity bodes well for the introduction of another viable optical disk feature. For the first time, you have the capacity to store all of an office's various types of information on one medium. The optical disk can store not only



# Illusion





## It's an unspoken certainty that intense industry competition will force end-user prices to fall sharply between late 1984 and mid-1985.

word processing text and graphics or charts but also complete digitized photographs or other video information.

Generally, the storage of video information is relegated to video tape or video disk media. The nature and complexity of a simple photographic or video scene requires a great deal of storage memory, computerwise. Teaming this video information with associated computer information currently requires a veritable conglomeration of equipment, including inter-

faces, video/data timing devices, cables and so on.

The ability to store both computer and digitized video data in one storage device further enhances the overall effectiveness and value of this new technology and will contribute to overall office efficiency.

### One Limitation

It follows that in order to complete the data storage circle, you must be able not only to write and read information to and from the optical disk

but also to erase or update information already stored on it.

Currently available optical disks can only be written on once; they can't be erased and written on again. Because of the nature of the recording process, it's not easy to find material that can be laser-modified to reflect written data, then changed again to reflect a blank (erased) area that can be reused.

Therefore, at present, optical disks are best suited for archival purposes or other write/read-only office requirements. The optical disk manufacturers currently report that reusable write/read/erase systems are in the final stages of research and testing and will be available shortly.

Even though you can write information to the optical disk only once, the immense archival storage capacity of current write/read optical disks far outweighs the temporary limitation imposed by present technology.

Initially, optical disk prices will seem high, especially to those people used to a \$400 floppy disk unit or \$3000 hard disk drive.

Current rough estimates are that a complete optical unit capable of storing 500MB to 800MB will cost from \$17,000 to \$19,000 as of this writing. However, more than 30 American and foreign manufacturers have announced soon-to-be-available mass-produced microcomputer op-disk units. It's an unspoken certainty that intense industry competition will force end-user prices to fall sharply between late 1984 and mid-1985.

Even though the cost comparison chart (Table 2) assumes a fairly expensive optical disk system, it follows that as optical disk hardware moves into mass production and prices fall, the associated optical storage cost per page will begin to drop below the standard paper office per-page cost.

### PC Implications

Because of the immense market created by the IBM PC and clones,

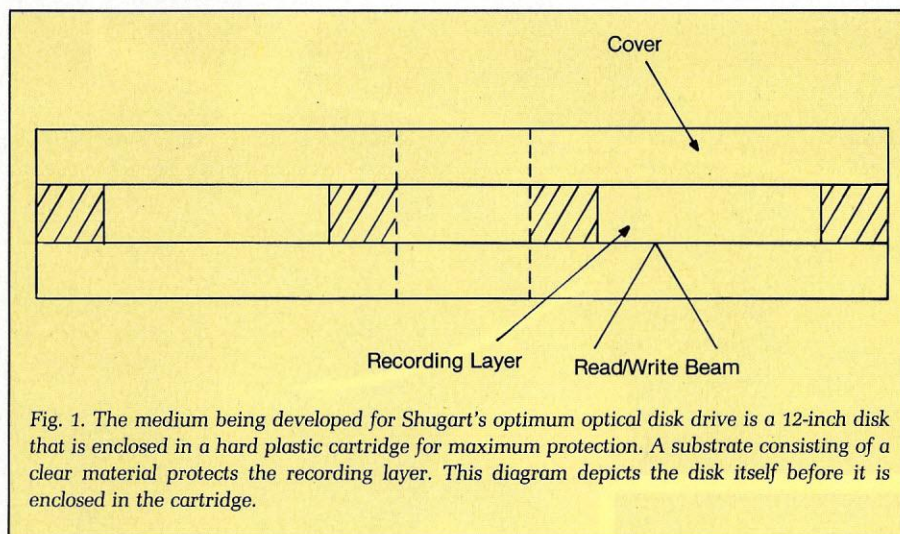


Fig. 1. The medium being developed for Shugart's optimum optical disk drive is a 12-inch disk that is enclosed in a hard plastic cartridge for maximum protection. A substrate consisting of a clear material protects the recording layer. This diagram depicts the disk itself before it is enclosed in the cartridge.

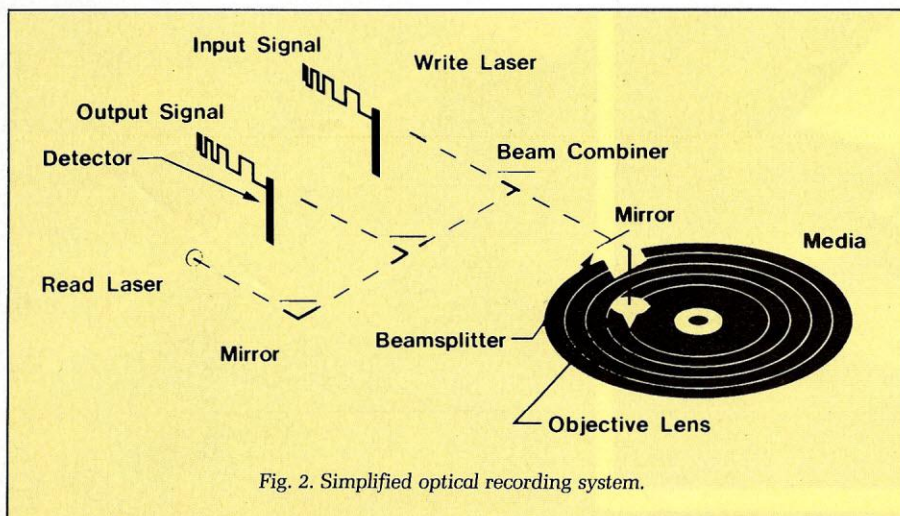


Fig. 2. Simplified optical recording system.



## I doubt that optical disk drives will totally replace either floppy or hard disk technology.

PC owners will most likely have a front seat when optical disk offerings come on the market. A number of optical disk manufacturers have indicated that the first low-cost, mass-produced optical units available will be those compatible with the IBM PC (and compatibles). Disk sizes will vary, depending upon storage capacity, but current optical disk media ranges from three inches to 14 inches in diameter.

You should note that in order to take advantage of the video data recording capabilities inherent in the optical disk, many current PCs will either have to be equipped with upgraded high-resolution capabilities or be integrated into commercially available computer/video display systems.

It might also be a wise idea to consider expanding the internal/external RAM memory of existing PCs so that larger chunks of data can be taken in from the disk drive storage media at one time.

New and more involved PC software, especially in the graphics and database arenas, will most likely evolve to take advantage of the optical disk's enormous capacity. As optical disks take hold of the current user base, which is always growing, look for many software vendors to expand their offerings in these areas.

### Requiem for a Lightweight?

With the introduction of optical disks, some thought must be given to the fate of the current floppy and hard disk storage media. It appears that both hard and floppy disks will continue to play an important role in PC operation for the foreseeable future. Each has clearly defined uses, and I doubt that optical disk drives will totally replace either floppy or hard disk technology. Current disk storage units will continue to exist side by side with the opticals, and the portable floppy disk itself will continue to be the workhorse of the personal computer workstation.

As far as hard disks are concerned, they'll still play an important part in the office. Because of lower initial cost coupled with a fairly large capacity (as compared to a floppy disk), hard disk drives appear to have a firm foothold in the PC office. Hard disk systems in many offices are, and will be, used for personal workstation storage or as a work scratchpad, and I expect this trend will continue well into the future.

As I've said, optical disks will mean more to the average office PC user than just vastly expanded storage space. Completely new avenues of

data storage are also part of the package.

In fact, it's a good bet that current optical disk features, like massive amounts of storage, video and graphics interaction and complete file storage on one medium, will be replaced by other sophisticated and innovative uses not yet even on the drawing boards.

For you PC users who are adrift on a sea of information, your ship has just come in. ■

Address correspondence to Joseph Rotello, Jr., 4734 E. 26th St., Tucson, AZ 85711.

#### Comparing a Single Storage Element: (in number of bytes)

Floppy Disk	Hard Disk	Optical Disk
400,000	10,000,000	1,000,000,000
(400KB)	(10MB)	(1GB)

#### Pages of Text per Single Storage Element (80-character lines, 66 lines per page, single-spaced):

Floppy Disk	Hard Disk	Optical Disk
75	1890	189,300

#### Storage Increase Factor:

Optical vs Floppy—2,500 times as much storage  
Optical vs Hard Disk—100 times as much storage

Table 1. Example of comparative storage densities.

	File Cabinet Cost	Optical Disk System Cost
Initial cost	\$1,200 (4 files)	\$20,000
250,000 pages (data)	2,500	1,000 (4 disks)
Total initial investment	3,700	21,000
Amortize cost over a five year period	740	4,200
Office space cost	800	100
Labor (filing, retrieval, assembling files from records)	3,000	200
Total annual cost	4,540	4,500
Cost per page per year (derived by total annual cost/250,000 pages)	.018 cents	.018 cents

Modified from industry source study.

Table 2. Example of comparative storage cost—standard paper office (file cabinet) vs optical disk system. The chart assumes a large capacity optical disk system including a computer, software, optical disks, optical drive and associated electronics.



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\*Prices apply at IBM Product Centers and may vary at other stores.

\*\* Available in July, 1984.



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You'll find two word processing programs in this series: There's DisplayWrite 1, for IBM personal computers—including PCjr. And DisplayWrite 2, with added functions for your PC, PC/XT or *Portable* PC.

You'll also find DisplayWrite Legal, a dictionary of about 16,000 words that a lawyer might need to check.

And you'll find DisplayComm, which lets your IBM PC send and receive text to and from other IBM PCs. If you're writing at the office, this program could also let you send text to an IBM Displaywriter down the hall. (From there, it could be sent on to an IBM host computer for distribution.)

## ***Some words on high function.***

The DisplayWrite word processing programs give you the time-saving features you'd expect from IBM. Justified margins, centered lines and pagination, for example. You'll even have prompts and messages to help guide you along.

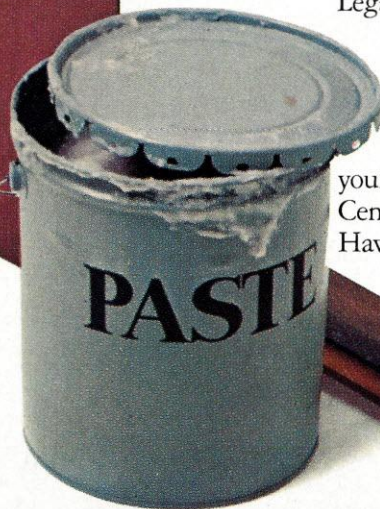
But there are also some features in DisplayWrite 2 you might not expect. Like easy column formatting, four-function math capability *plus* a spelling checker based on a dictionary of about 100,000 words.

Yet the biggest surprise of all may be the price.\* DisplayWrite 1,\*\* \$95. DisplayWrite 2, \$299. DisplayWrite Legal, \$165. DisplayComm, \$375.

## ***Where you can find all four.***

Get more information about the IBM DisplayWrite Series at your authorized IBM Personal Computer dealer or IBM Product Center. To find one near you, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.

Stop there first and get the last word.



***Personal Computer Software***

Circle 285 on Reader Service card.

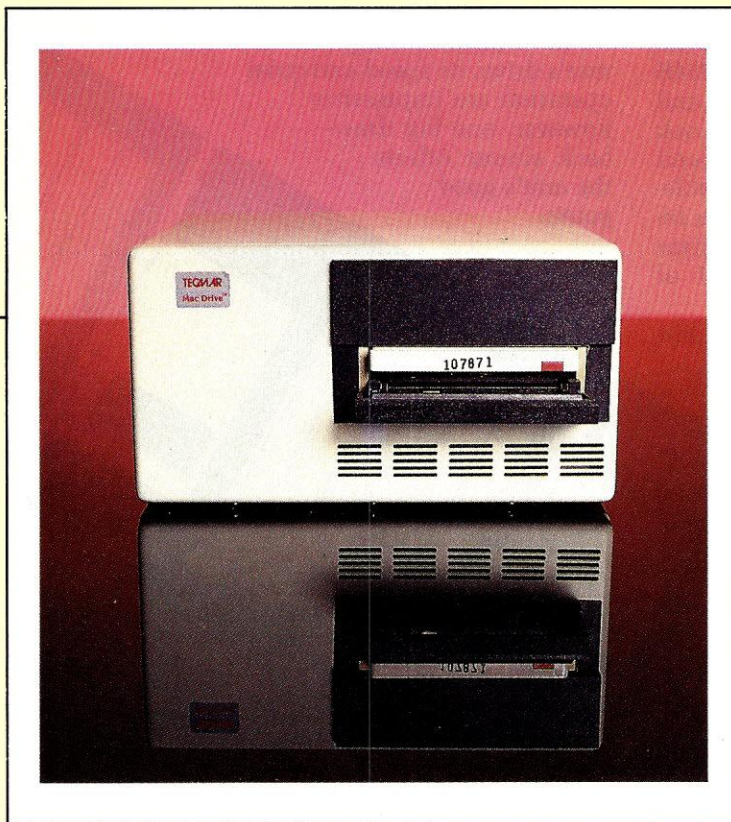






# Megabytes for Macintosh

By Jim Heid  
Senior Technical Editor



**The Battle of Tecmar's  
Mac Drive and Davong's  
Mac Disk**



A computer's shortcomings often provide a fertile breeding ground for third-party add-ons, and Apple's Macintosh is no exception. Two of the machine's biggest drawbacks—its limited mass storage and its slowness when loading programs and when running large programs with many overlays—have inspired at least two companies to introduce hard disk systems for the machine.

Tecmar's Mac Drive and Davong System's Mac Disk are the first two Mac hard disks to hit the market. This review looks at Tecmar's 5MB removable-cartridge system and at Davong's 10MB fixed drive. While each has its own advantages and disadvantages, both share some common disadvantages caused by the Macintosh's design.

### Tecmar's Mac Drive

Tecmar's drive is available in a number of configurations: you can get the unit with a single 5MB removable-cartridge drive, two 5MB removables or a 5MB removable and a 10MB fixed (see the Capsule Look box for prices). The unit I reviewed contained a single 5MB removable-cartridge drive, which, after you initialize it and copy a special System Folder to it, provides 4771KB of storage.

The removable cartridges look like a cross between 5¼-inch floppies and 3½-inch microfloppies. When you insert the cartridge in the drive,

disk begins spinning and is ready to use in about 30 seconds.

The Tecmar drive attaches to the Mac's modem port, an RS-422A serial interface. Computer and drive communicate at 920 kilobits per second. When the drive is accessed, its single front panel light flashes.

Attaching the drive to the modem port doesn't mean you lose that port, thanks to the fact that the RS-422A interface allows the attachment of peripherals in daisy-chain fashion. A second nine-pin connector on the drive's rear panel is ready for your modem or for other serial devices. (The Tecmar driver software that supports the second connector wasn't ready when this review was written; if your applications require the second connector, check with Tecmar concerning availability of the driver software before you buy a Mac Drive.)

### Using Mac Drive

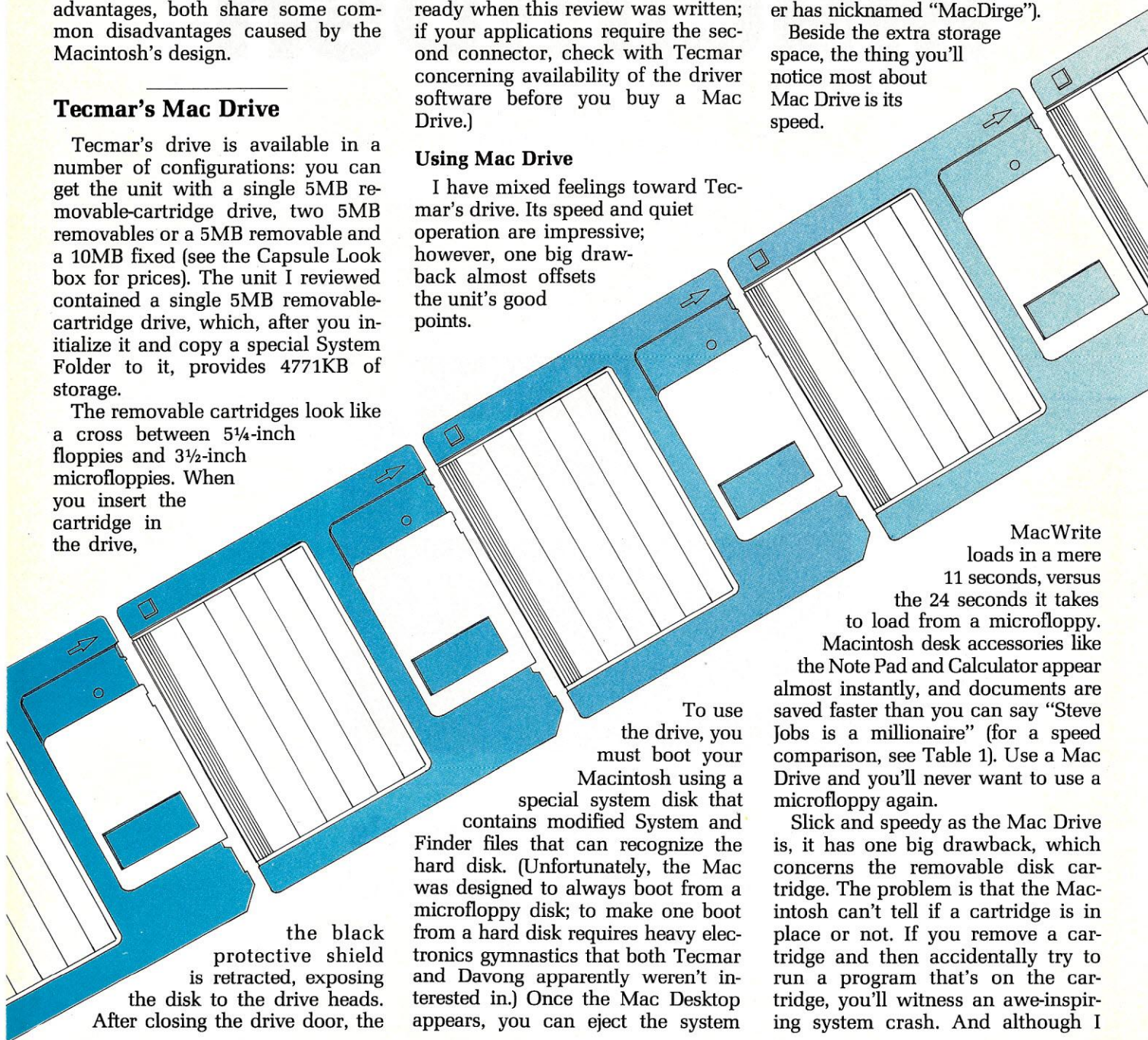
I have mixed feelings toward Tecmar's drive. Its speed and quiet operation are impressive; however, one big drawback almost offsets the unit's good points.

disk and work with just the hard disk.

The Tecmar drive has its own icon that appears on the Desktop. You can copy files and entire disks to the hard disk by simply dragging the items to be copied to the Mac Drive icon. You must be careful not to copy a System Folder to the hard disk, however; if you do, you'll replace the files that are modified to use the hard disk.

Mac Drive's cooling fan is pleasantly quiet, as is the hard disk itself. You'll hear an occasional chirp as its heads dart around, but it's certainly quieter than the Mac microfloppy drive's song (which our Senior Writer has nicknamed "MacDirge").

Beside the extra storage space, the thing you'll notice most about Mac Drive is its speed.



the black protective shield is retracted, exposing the disk to the drive heads. After closing the drive door, the

To use the drive, you must boot your Macintosh using a special system disk that contains modified System and Finder files that can recognize the hard disk. (Unfortunately, the Mac was designed to always boot from a microfloppy disk; to make one boot from a hard disk requires heavy electronics gymnastics that both Tecmar and Davong apparently weren't interested in.) Once the Mac Desktop appears, you can eject the system

MacWrite loads in a mere 11 seconds, versus the 24 seconds it takes to load from a microfloppy. Macintosh desk accessories like the Note Pad and Calculator appear almost instantly, and documents are saved faster than you can say "Steve Jobs is a millionaire" (for a speed comparison, see Table 1). Use a Mac Drive and you'll never want to use a microfloppy again.

Slick and speedy as the Mac Drive is, it has one big drawback, which concerns the removable disk cartridge. The problem is that the Macintosh can't tell if a cartridge is in place or not. If you remove a cartridge and then accidentally try to run a program that's on the cartridge, you'll witness an awe-inspiring system crash. And although I



couldn't verify it because my evaluation unit included only one cartridge, I suspect that removing one cartridge and replacing it with another without rebooting could cause disk-destroying problems.

Tecmar should add a safeguard that prevents users from removing the cartridge unless the unit

The manual also doesn't cover removing a disk cartridge and inserting a different one while the computer is on. As mentioned above, doing so could be disastrous.

#### The Verdict on Tecmar

Tecmar's Mac Drive works well, except for the cartridge-removal problems. It's fast and quiet and, under normal circumstances (as long as you don't remove the cartridge at the wrong times), it should perform reliably. Its documentation is flawed and sketchy, but all except the most inexperienced users should be able to work around it.

In short, Mac Drive would be the drive to buy if no others were available.

#### Davong's Mac Disk

However, another drive is available, and it's a better one. Davong's

Mac Disk is the other contender in the MegaMac ring. Mac Disk has a couple of distinct advantages over Tecmar's drive and just seems to be a better developed product.

In addition to the 10MB version reviewed here, Mac Disk is available in 21MB, 32MB and 40MB configurations (see the Capsule Look box for prices). As stated, all Mac Disks use fixed-disk Winchester technology.

Unlike Tecmar's drive, Mac Disk can connect to either the Macintosh's modem or printer port. Like Tecmar's drive, it has a second DB-9 connector on its rear panel so you can attach another serial device. (Although, like Tecmar's, the driver software that supports the second connector wasn't finished when I wrote this review.) The drive and the Mac communicate at about 900 kilobits per second, giving the drive an effective throughput of about 100KB per second.

The Mac Disk requires no special initialization procedures. The unit is ready to use as soon as you plug it in.

#### Using Mac Disk

Mac Disk works much like Mac Drive. You always have to boot your Mac from a microfloppy that contains the hard disk drivers, but as

is shut off. It might be a minor inconvenience, but it's worth it when megabytes are at stake.

#### Documentation

The 40-page Mac Drive manual merits only a fair rating. The installation instructions are clear and easy to follow, but the section on backing up your original Mac Drive system microfloppy is confusing and somewhat inaccurate. (It tells you that, after you insert a new disk, its icon is displayed, then it's initialized. Actually, you're asked if you want to initialize the disk. Then it's initialized and its icon is displayed.)

### A Capsule Look at the Macintosh Hard Disks

<b>Name of product:</b>	<b>Mac Disk</b>	<b>Mac Drive</b>
<b>Type of product:</b>	10MB fixed Winchester disk drive	5MB removable hard disk drive
<b>List price:</b>	\$2395	\$1995
<b>Other configurations:</b>	21MB (\$3295) 32MB (\$3995) 40MB (\$4495)	Two 5MB drives or one 5MB removable and one 10MB fixed (\$3290)
<b>Manufacturer:</b>	Davong Systems Inc. 217 Humboldt Court Sunnyvale, CA 94089	Tecmar Inc. 6225 Cochran Road Cleveland, OH 44139



Drive	Load MacWrite	Quit to Finder	Load MacWrite And 41KB Document	Save 41KB Document
Davong Mac Disk	7.7	5.5	10.2	3.8
Tecmar Mac Drive	11.0	10.5	13.8	5.9
Microfloppy	23.8	14.5	29.7	15.3

Table 1. Speed comparisons between Davong's 10MB Mac Disk, Tecmar's 5MB removable-cartridge Mac Drive and the Macintosh's built-in 3½-inch microfloppy drive. All tests were done with Finder version 1.1g and MacWrite version 2.20. All times are in seconds.

soon as the Desktop appears, you can eject the floppy and work with just the hard drive.

While it's operating, the Mac Disk's four front panel lights keep you informed. One light indicates power while another indicates drive access. A third lights up when data is passing through the serial port, and the fourth lets you know when Mac Disk is remapping a flawed area. The lights also illuminate in turn when the drive performs its start-up diagnostics.

While indicator lights aren't necessary to proper operation, they're a nice touch. They make using the Mac Disk much like driving a car with full instrumentation—using Tecmar's unit is like driving one with idiot lights.

Unfortunately, Mac Disk also makes its presence known with its fan, which is much more noticeable than the fan in Tecmar's drive. It's not annoyingly loud like the helicopters in a Compaq or a Zenith, but it's louder than it ought to be.

The fan fades into insignificance, though, after you've used the drive for a while. Mac Disk performs beautifully. In my tests, it performed 30 to 40 percent faster than Tecmar's Mac Drive (see Table 1).

Mac Disk comes with a diagnostic utility that you can run to check the unit's operation. The diagnostic first checks the drive's hardware, then verifies the disk itself, without erasing anything. If any flawed areas are found, they're remapped. If other problems exist, you're told about them in clear English.

Davong is working on additional utility software for Mac Disk, which should be ready by the time you read this. The utilities will allow you to back up the hard disk to floppies (even files that won't fit on a single disk), restore the backed-up data to

the hard disk and partition the hard disk into a number of volumes.

### Documentation

Davong tops Tecmar in the documentation department, too. The Mac Disk manual is well-written and sensibly organized. A little table at the beginning shows you which chapters you should read, depending on whether you're the Mac Disk installer, user, troubleshooter or programmer.

The manual contains thorough set-up and use instructions, all well-illustrated. One appendix contains explanations of error messages and instructions telling you what to do about them; another contains technical notes and specifications; and a glossary brings up the rear. Unfortunately, though, the manual lacks an index.

### Common Disadvantages

The Mac Disk may be better than the Mac Drive, but they both share some common disadvantages that point not at Davong or Tecmar, but at Apple.

The first disadvantage is that both units must attach to the Mac through its serial ports rather than through hard disk interfaces. Fast as the RS-422A standard is, it's still not fast enough to keep up with a hard disk drive. The Syquest drive in Tecmar's unit is capable of transferring five megabits a second. Because of its interface, though, the Mac Drive can manage only 920K bps. The same holds for the Davong unit. Its drive isn't running anywhere near top speed, either.

The second disadvantage relates to how the Macintosh Finder (the portion of the operating system that manages files and programs) works. When you eject a microfloppy disk, the Finder writes certain vital statis-

tics to the disk, such as the positions of the icons on the Desktop. It also deletes any files that you've recently put in the Trash.

If you simply shut off your Mac without ejecting the disk, those statistics aren't saved. You could be surprised the next time you use that disk to find icons in different positions than you left them and files still present that you thought you threw away. Worse yet, you could lose data.

Both Mac hard disk drives require you to "eject" their respective icons before you shut them off. This is unfortunate because it's something novice users are likely to forget to do (it's easy to remember to physically eject a microfloppy, but it's confusing and hard to remember to eject a disk that never really leaves the unit), and because a lot more data is at stake on a hard disk, and backups are generally not as common.

The Tecmar drive adds another negative point: If you "eject" the Mac Drive icon by mistake (it's easy to do), there's no way to "insert" the disk again—you have to restart the computer. It's mighty frustrating staring at a dialogue box that says, "Please insert the disk: Mac Drive" when you know that disk *physically* never went anywhere and there's no way to insert it. (By contrast, when you "eject" the Davong Mac Disk icon, it dims for a moment, then darkens again, reminding you that the disk never really went anywhere.)

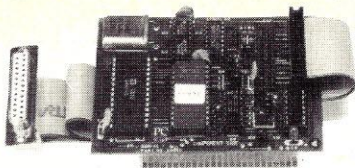
These problems aren't major (as long as you remember them), and they shouldn't keep a Mac owner from buying either of the two units reviewed here, especially since future Mac hard disks will probably have them, anyway. But they're disappointing. The Macintosh redefined "ease of use;" it's a shame to see anything degrade that ease.

### The Envelope, Please

No matter which Mac hard disk you buy, you'll be pleased with the added storage and the greatly improved performance. You'll also be disappointed and probably annoyed with the "ejection" requirement, but keep in mind that's a factor of the Mac's design.

But unless you need the removable cartridge, consider the Davong Mac Disk first. Besides being faster than Tecmar's, it's a better designed product. While Mac Drive works, Mac Disk works well. ■



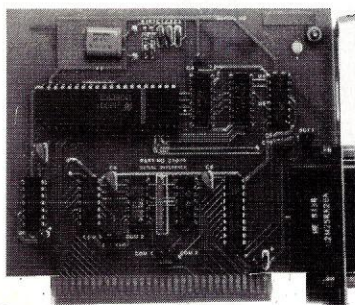


### SERIAL INTERFACE for Apple ][ and //e

Connect any serial device such as a printer, mouse, plotter, modem, etc., to your Apple ][ or //e. Features:

- Asynchronous EIA RS-232C I/O
- Multiple drivers (up to 8) resident in EPROM optional 2K RAM
- Apple soft, Pascal, and CP/M compatible
- Full or Half Duplex
- Separate DCE and DTE Connectors
- Crystal controlled baud rate, software programmable from 50 to 19200 including 134.5, plus hardware default setting
- Programmable control register
- Parity, overrun, and framing error checks
- Software programmable interrupts
- Data is double-buffered
- Choice of 4 handshake signals (Jumper)
- DCD\*, DSR\* and/or CTS\* hardware override (Jumper)
- DMA and interrupt daisy-chain supported
- RS-232 cable included

Part NO. 22040

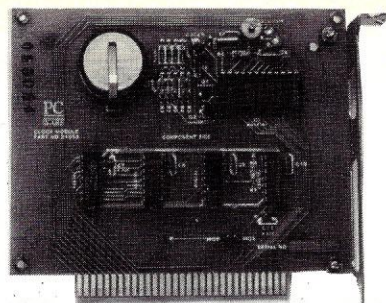


### SERIAL COMMUNICATIONS ADAPTOR for IBM PC or XT

Connect any serial device such as a printer, Modem, plotter, mouse, terminal, etc., to your IBM PC or XT. Features:

- Fully IBM compatible
- Asynchronous EIA RS-232C I/O
- Hardware selection of I/O mapping (Jumper)
- Fully software programmable
- Fully prioritized interrupts to control transmit, receive, error, line status and data set interrupts
- Diagnostic capability to provide loopback functions for transmit/receive and input/output signals
- Powerful Intel INS8250 UART (or equivalent)
- Supports full or half duplex
- Simple DCE/DTE configuration header
- Crystal controlled baud rates, software programmable from 50 to 19200 including 134.5
- Programmable control register
- Parity, overrun, and framing error checks
- Data is double-buffered
- External receiver clock input available
- Modem control functions supported (e.g. CTS, RTS, DTR, RI and carrier detect)
- False-start bit detection
- Line-break generation and detection
- Choice of 4 handshake signals (Jumper)
- DSR\* and/or CTS\* hardware override (Jumper)

Part No. 21010

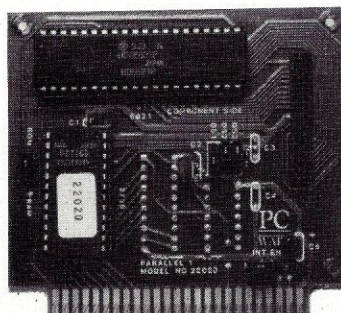


### CLOCK CALENDAR for IBM PC or XT

This board maintains the time and date for your IBM PC or XT so you don't have to enter it when you turn the computer on. Features snap in battery holder. Battery and software included. Features:

- DOS compatible
- Comes with software driver
- Will fit in any slot including the small slot in back corner
- 3 yr. Lithium battery backup

Part No. 21050

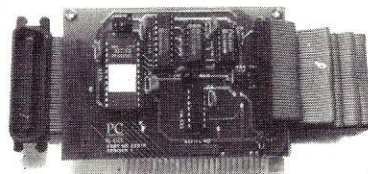


### PARALLEL I/O INTERFACE for Apple ][ and //e

Connect any parallel device to your Apple ][ or //e. This is a general purpose I/O port. Features:

- Multiple drivers onboard in EPROM (Interchangeable 2K RAM)
- Applesoft, Pascal, & CP/M Compatible
- Dual 8-bit bi-directional parallel ports
- Four handshake lines
- Conveniently located ribbon connector

Part No. 22020

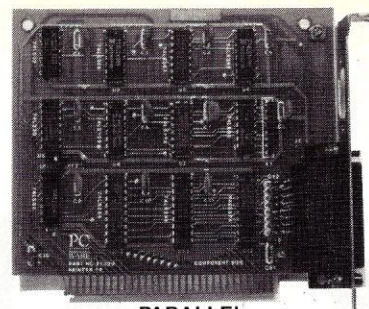


### PARALLEL OR CENTRONICS PRINTER INTERFACE for Apple ][ and //e

Connect your Apple ][ or //e to a parallel printer. Features:

- Multiple drivers onboard in EPROM (interchangeable 2K RAM)
- Applesoft, Pascal & CP/M Compatible
- 2 handshake lines (ACK\* and strobe\*), 4 status\* lines (select\*, Busy, Paper out, and Prime\*)
- Centronics data bit 8 may be jumpered low
- Conveniently located ribbon connector

Part No. 22010  
• With cable included  
Part NO. 22011

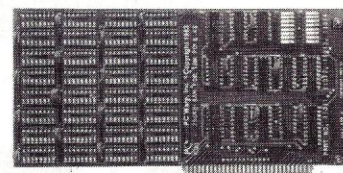


### PARALLEL PRINTER ADAPTOR for IBM PC or XT

Connect any parallel device such as a printer to your IBM PC or XT. Features:

- Fully IBM compatible
- May be used as a general purpose I/O port
- 12 buffered TTL Latched outputs
- 5 buffered TTL inputs
- Fully Software programmable
- Software controlled interrupts
- Reset of target peripheral/device with system
- Industry standard D-shell connector for I/O

Part No. 21020

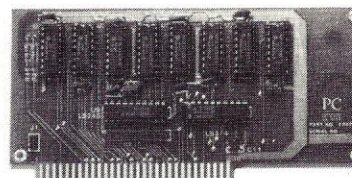


### 256K/512K RAM BOARD for IBM PC or XT

Add up to 256K/512K of memory in 64K increments to your IBM PC or XT. Features:

- Dip Switch Address Selectable on any 64K Boundaries

256K Part No. 11010  
512K Part No. 11030



### EXTENDED 80 COLUMN CARD for Apple //e

Display 80 characters across and add 64K of memory. This board is for the Apple //e only. Features:

- 64K RAM
- Functionally identical to the Apple version

Part No. 22070

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# Columbia:



By Edward Joyce

*"The first engineer to implement a design displays ingenuity; the second exhibits plagiarism; the third demonstrates a lack of originality; and the fourth draws from common stock."*

*—overheard in Silicon Valley.*

**C**ommon stock. That's what the IBM PC-compatible portable market has evolved to. Columbia, Compaq, Corona, Seequa, Bytec and even IBM, as of February 16, 1984, are touting lookalike portables. Set these computers side by side, and you have assembly line homogeneity in the best tradition of Henry Ford.

Yet beyond the packaging similarity lies a nest of differences, reflecting the diverse corporate roots of these products. The most notable difference, price, varies over a range of thousands of dollars. In this category, one PC portable stands head and shoulders above the crowd—the Columbia VP.



# The Gem of the Portables?

The VP embodies 128KB of RAM, two double-sided disk drives, graphics interface, serial and parallel ports and one expansion slot. The hardware alone makes this machine competitive in price with most PC-compatible computers. But then Columbia ices the cake by throwing in enough software to open your own retail store. The bundled programs list at \$3145 and cover the spectrum of applications, including word processing, spreadsheet, electronic filing, communications and others.

Of prime concern when evaluating a machine like the VP is the extent of its compatibility with the IBM PC. Columbia wins top honors in this category. Future Computing Inc. ranks Columbia alongside Compaq as being the most "operationally compatible" of 32 different 8088/8086-based microcomputers. This evaluation is based on the fact that Columbia and Compaq computers run the top-selling software and support add-on boards intended for the IBM.

## Hardware Internals

Achieving a high degree of compatibility means the internals of the VP should resemble the IBM PC, which they do. The 8088 microprocessor runs at the prescribed 4.77 MHz. Alongside the 8088 on the motherboard is 128KB of RAM, which comes standard with the system, 12KB of ROM and a socket for an 8087 numeric processor.

The two disk drives support double-sided, double-density, 5¼-inch floppies containing 320KB each. Of course, these drives can also handle single-sided, 160KB disks. (Under ver-

sion 2.1 of the MS DOS operating system, the disk capacities can be increased to 180KB and 360KB.)

In its larger, desktop computers, Columbia uses standard disk drives, identical to the ones in the IBM PC. The VP's designers departed from the standard drives, instead relying on slimline, half-height drives.

Besides compactness, one of the best features of the slimline drives is the door latch. The latch has only two positions, opened and closed, and it cannot be closed without a disk in the drive. This nifty mechanism takes the guesswork out of inserting a disk into the drive. After loading hundreds of disks, I never once encountered a "drive not ready" error because the disk wasn't properly seated on the drive spindle.

Columbia proudly bills the VP's keyboard as IBM standard, which it is. Key for key, it mirrors the sacred IBM precedent. If you're concerned with matching IBM software precisely, the keyboard is a plus. For those of us who prefer traditional layouts, the VP gets automatic membership in the how-not-to-design-a-keyboard club. To their credit, the VP's designers did add LEDs (light-emitting diodes) to the caps lock and number lock keys. The LEDs light up when these keys are in the locked positions.

Unfortunately, keyboard compatibility extends to the mushy feel found on many IBM PC clones. The keys move laterally almost as much as they move vertically. I'll side any day with a full-travel, positive feedback keyboard.

To expand the system, the VP offers only one full-length expansion

slot. Limited expansion seems to go hand-in-hand with portability, and the VP is by no means the only portable with this constraint. Mike Watkins, assistant manager of the Dynabyte computer store in Charlottesville, VA, configures the expansion slot "very carefully." He relies on multifunction boards like the AST SixPakPlus, Quadram Quadboard or Orchid PCnetPlus to pack the most utility per square inch.

The single expansion slot can be used to increase the VP's 128KB base of RAM memory. Columbia sells a 256KB add-on board for \$645. Alternately, the slot can be saved for game cards or other uses—the motherboard accepts additional memory piggyback style. The piggyback card costs \$445 and adds 128KB of memory to the system.

The first problem I encountered with the VP was related to the expansion slot. The slot opening was too short for some expansion boards. Consequently, inserting a board challenged my physical prowess. I streamlined the process considerably by shaving a millimeter from the fiberglass insert portion of each expansion board, carefully avoiding any damage to the gold contacts.

Later, I quizzed Columbia about the tightness. The technical representative admitted, "You can lift the entire machine trying to remove an expansion card," but she also assured me that only a handful of the first manufactured units exhibited this difficulty and that I could have the problem corrected at no charge by Bell & Howell's nationwide service. A spot check among other VP owners con-



**Although the VP's display is sharp and clear,  
for serious word processing I can't recommend  
the VP or any other nine-inch screen. But that's  
part of the price you pay—nine-inch screens  
are the only portable game in town.**

firmed her assertion—no one else aired this gripe.

While a single expansion slot can cramp your style, it's not as bad as it appears at first glance. Functions that normally require an expansion board on the IBM PC are inherent in the VP. Graphics, serial and parallel interfaces are built into the system and require no expansion cards.

The serial interface is a standard RS-232C port that the VP drives at speeds ranging from 110 to 19,200 bits per second (bps). The parallel port is Centronics compatible and is usually reserved for the printer.

### **Nice Display**

The display interface rates as one of the nicest features of the VP. The display may be operated in text mode or graphics mode on the nine-inch nonglare screen. In text mode, characters are displayed on an 80 × 25 grid or a 40 × 25 grid. In graphics mode, the screen can be set for 640 × 200 pixels high-resolution or 320 × 200 pixels low-resolution.

The graphics mode also emulates color, even though the VP's monitor is monochrome. This is accomplished by substituting intensity levels for colors. The bottom line is that the VP executes software configured for color monitors without a single change. I ran several programs requiring color and they performed flawlessly. In most cases, the lack of color was hardly noticeable.

The VP may be purchased with either an amber or green phosphor monitor. The widespread use of amber screens started in Europe. Labor

unions there contend that the yellow color is easier on the eyes. Over the past couple of years, amber has been slowly edging green out as the standard CRT color. I expect amber screens will be gaining more momentum since IBM just threw its weight behind amber, incorporating it into the new Portable PC.

Although the VP's display is sharp and the amber color may be easy on the eyes, for serious word processing I can't recommend the VP or any nine-inch screen, for that matter. Side by side, a nine-inch screen doesn't seem much smaller than a full-size, 12-inch screen. In actual surface area, though, you're dealing with almost 50 percent less. Imagine reading books, magazines and letters on paper half the original size. Get the picture? That's part of the price you pay for portability, though; nine-inch screens are the only game in town.

### **More Attributes**

Besides the amber display and slimline disk drives, another attribute worth mentioning on the VP's front side is the open space above the drives. Presumably, the machine's architects left this available for a future hard disk. In the meantime, it serves as dual seven by 5½ by 1½-inch storage cabinets. The cabinets conveniently accommodate disks and the VP's operations guide.

Other distinguishing hardware characteristics become apparent by viewing the machine from the backside. The cables for the keyboard, serial port, parallel port and expansion board all plug into the back. The carrying handle as well as two posts for

wrapping the power cord are located on the back panel, too. One corner of the panel is left open for a cooling fan, which, incidentally, does its job with hardly a whisper—much more pleasing than the air raid siren fans of other, purported personal computers.

Additional hardware found on the posterior includes a screen brightness control knob, power on/off switch and reset switch. From what I could glean, the reset switch generates a nonmaskable interrupt that invokes the VP's power-on initialization routines. On the IBM PC and many other machines, reset is accomplished through the keyboard by simultaneously pressing the Ctrl, Alt and Del keys. The VP also supports this method and it works fine in most situations. If a program drifts off into the Twilight Zone or inexplicably disables keyboard interrupts, however, you can pound on Ctrl-Alt-Del all day without a response.

When this occurs on computers that lack a reset switch, you're left with no other recourse than removing the disks and powering down, a relatively traumatic exercise for the electronic innards, just to regain control of the machine. The VP's reset switch provides a convenient method of knocking wayward software out of a trance without zapping the circuitry with a power surge.

### **Ton of Software**

Complementing the VP's hardware is a robust selection of software. Realistically, I should say that the software overwhelms rather than complements. After all, it costs \$3145 bought separately or \$155 more than



**My first impression of Columbia's Super Pack was  
manana; approach this sea of software some other  
time. But then an enticing little program called  
Space Commanders caught my eye...**

the hardware. It comes on eleven disks; you almost need an electronic filing system to sort it all out and, fortunately, that's included.

I distinctly remember the day I unpacked the VP and its library of software. It was late on a Friday afternoon of a long week, one of those days when my exhausted brain cells couldn't even handle the intellectual challenge of *Sesame Street*. I glanced at the 16 software products and several pounds of documentation included with Columbia's Super Pack. My first impression was *manana*; approach this sea of software some other time with fresh energy. But then an enticing little program called *Space Commanders* caught my eye. Within minutes, my too-tired-for-*Sesame Street* mind was defending planet Earth against ruthless invaders from distant galaxies.

I relate this story to illustrate what I perceive to be a psychological ploy on Columbia's part. It throws in a game to acquaint novices with the machine and dissolve any lingering fear of computers. As a battle-tested *Space Commander*, I salute this thoughtfulness.

On the serious side, the VP's programs cover the gamut of common applications. The Perfect Software series anchors the selection with Perfect Writer and Perfect Speller for word processing, Perfect Calc for spreadsheets, Perfect Filer for information management and Perfect Link for data communications. Plotting and charting are taken care of by Fast Graphs from Innovative Software. Finally, Home Accountant Plus, the popular program from Continental Software for personal bud-

geting, rounds out the offerings of applications software.

None of these programs win top honors in their respective functional areas. Nonetheless, they're there when you need them, *gratis*, and they can save you a tidy sum. For example, I seldom use data communications. When I do, Perfect Link gets the job done despite its flaws (if Perfect Link tries to write on a disk that you inadvertently left write protected, the program hangs in limbo without even a flicker of an error message). Since Perfect Link comes at no charge and I'm not an everyday user of communications, I can live with it. If I were investing hard-earned greenbacks on software alone, however, my money would be spent elsewhere.

The same holds true for the other members of the Perfect family. Computing connoisseurs won't be forsaking products like WordStar and Multiplan for Perfect Writer and Perfect Calc.

Underneath the applications software, Columbia bundles dual operating systems with the VP: Microsoft's MS DOS version 1.25 and Digital Research's CP/M-86 version 1.1. I spent little time with CP/M on the VP, since all of the applications software is configured for MS DOS.

Included with MS DOS are Microsoft's GW Basic, BasicA, and MASM, the macro assembler. Functionally, these programs operate as advertised, but the documentation is miserable. For instance, the assembler book combines manuals for the assembler, linker, library manager and cross-reference utility. Each manual has its own index and page numbering with

### Side by Side: Columbia VP and IBM PC

	Columbia VP	IBM PPC
Microprocessor	8088 4.77 MHz	8088 4.77 MHz
Memory	128KB	256KB
Disk Drives	two 320KB	two 320KB
Expansion Slots	one full-length	three full-length, two shorties
Display Type	monochrome or graphics	graphics only
Screen Color	amber or green	amber
Parallel Interface	yes	no
Serial Interface	yes	no
Fan	yes	yes
Weight	32 pounds	30 pounds
Price	\$2995	\$3220

Table 1. Even without software, Columbia's VP holds its ground against IBM's new portable.



## Columbia's VP: A Capsule Look

### Manufacturer

Columbia Data Products, 9150 Rumsey Road, Columbia, MD 21045.

### Price

\$2995.

### System Unit Features

8088 microprocessor running at 4.77 MHz; 128KB RAM; nine-inch, nonglare monitor.

### Mass Storage

Two half-height 320KB 5¼-inch floppy disk drives.

### Input/Output

RS-232C serial port, 110 to 19,200 bits per second; Centronics parallel port.

### Software

Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Perfect Link, Fast Graphs, Home Accountant Plus, Space Commanders, MS DOS version 1.25, MS DOS RAM Disk, CP/M-86 version 1.1, GW Basic/BasicA, Macro Assembler and Diagnostics.

### Physical Characteristics

Size: 18 x 16 x eight inches covered.  
Weight: 32 pounds.

### Expansion

8087 arithmetic coprocessor; one IBM PC-compatible full-length expansion slot; 128KB RAM memory on piggyback adapter; 256KB RAM memory on expansion card.

no physical separation between the parts, making it hard to locate a particular section. I ended up using paper clips on the starting pages of each manual within the book for quick reference. Once you find a particular manual within the book, the sparse contents often fall short. The assembler manual, for example, lacks a list of instruction mnemonics, a vital piece of information expected in any decent assembler manual.

Obviously, part of the VP's budget price stems from the barebones operating system documentation. Columbia photocopied Microsoft's stock documentation. It's certainly low grade and not comparable to IBM's superior manuals.

### Courteous Memory Test

Delving deeper into the system software, you come upon the ROM routines. The most attractive asset here is the optional memory test. Upon powering on the VP, you're asked, "Test memory?" A no response to this question or neglecting to answer within five seconds initiates disk bootstrapping.

I quickly became enamored of this minor courtesy. Anyone who has ever been forced to sit through a memory test on an IBM PC configured for 512KB will count his blessings every time these two words appear on the screen.

If the VP does fail the memory test or exhibit other symptoms of hardware illness, Columbia wisely delivers 10KB of software for diagnosing the system. This includes programs for testing the motherboard, RAM, keyboard, screen moni-

tor, disk drives, printer and joysticks (if you add them to your system). In my opinion, diagnostics are as indispensable as the ac power cord.

Should a hardware malfunction occur within 90 days of the purchase date, the warranty covers repair. Bell & Howell's nationwide network of 600 field representatives and 175 service locations handles the hardware maintenance. Perfect Software provides software support through a toll-free telephone number.

### Osborne Formula

Overall, Columbia has packaged a hard-to-beat combination of hardware and software. Ounce for ounce, the system delivers more value than IBM's PC. Strip the VP of its bundled software, as shown in Table 1, and it still prices below a comparably equipped IBM PPC (Portable Personal Computer).

Regarding the compatibility issue,

the Columbia lives up to its reputation for being functionally equivalent. Out of dozens of IBM PC programs I tested, only one failed on the VP. It was a Basic program that dipped into the IBM PC's ROM. This program fails on other PC clones as well.

To underscore compatibility, Columbia publishes a list of more than 500 software packages that run on the VP as they would on the IBM. The company's representative acknowledges that there are a few exceptions (most notably some Spinnaker games) because "they do funny things with the ROM."

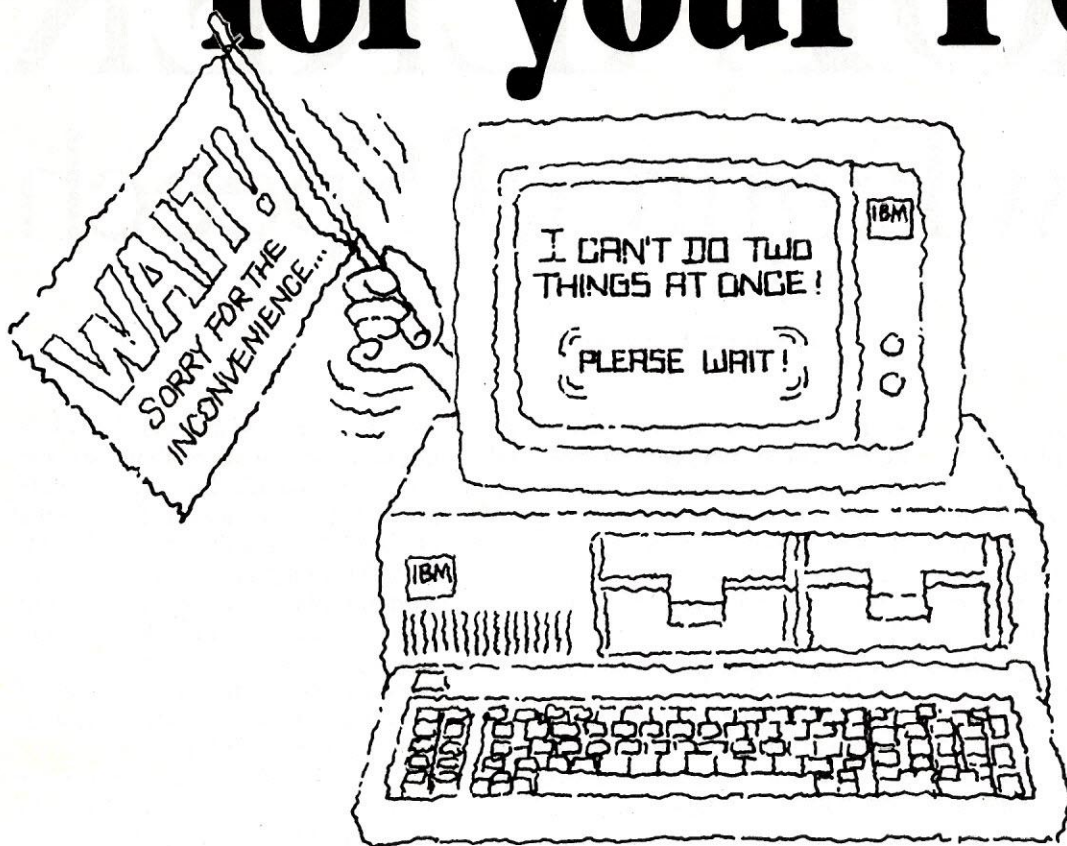
The machine is as portable as any portable, which really means transportable. You won't sashay into an elevator or airplane swinging the 32-pound VP like an empty briefcase. On the other hand, you won't have to lug around three shipping cartons with a wheelbarrow to transport your personal computer.

The VP creates its own niche in the 16-bit portable world by following the proven formula pioneered by Adam Osborne—bundle an attractive piece of hardware with a ton of software. Columbia's competitors would probably be happy to see the VP follow Osborne one step further—to bankruptcy. But given the success of Columbia's desktop computers and the growing cadre of bargain-conscious computing consumers, that's not about to happen. On the contrary, living in the district of Columbia is about to take on a new meaning. ■

Address correspondence to Edward Joyce, Route 9, Box 149, Charlottesville, VA 22901.



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# ProTALKER

## A New Figure of Speech

By Glenn F. Roberts

**C**omputer-generated speech is a microcomputer application that has moved forward at an exciting pace in recent years. One of the latest advancements in this field is the ProTalker speech digitizer from Speech Ltd. Using ProTalker and your IBM PC or S-100 computer, you can produce extremely high quality speech under computer control.

### In the Beginning...

The first popular speech synthesis circuits began to appear about three years ago and used a technique called phoneme synthesis. These synthesizers reproduce about 40 phonetically unique sounds, which can, in theory, be combined in sequence to form any word or phrase. Working with this type of synthesizer can be tedious; you must have a good program that lets you edit a string of phonemes to obtain the desired sound. Phoneme synthesizers do, however, have the advantage of storing speech in a relatively small amount of memory, requiring a separate byte for each phoneme or pause. The speech from these synthesizers is rather mechanical sounding and sometimes difficult to understand.

### Fixed Vocabulary

Another important class of speech synthesizers is the fixed vocabulary type. These devices work from a fixed set of words and phrases that are digitized from actual human speech and stored in a ROM device. Since the speech is actually human, it's quite intelligible. However, in programming these devices you're limited to

whatever vocabulary is stored in the ROM. These synthesizers are well-suited to certain applications, like educational toys and the whole range of "talking" consumer devices, including home appliances, automobiles, elevators and even vending machines.

### Integrated Circuits

The latest advance in computer-generated speech is an integrated circuit from Oki Semiconductor that lets you digitize and play back speech as easily as you might use a portable tape recorder, except it's computer-controlled.

This circuit uses a technique called adaptive differential pulse code modulation (ADPCM) to convert analog speech into digital data in a manner that requires considerably less storage than other digitization techniques. It's this integrated circuit, the Oki MSM5218 analyzer/synthesizer, that's the heart of the ProTalker speech board.

### Nitty Gritty

The ProTalker is manufactured and supported by Speech Ltd. of Palo Alto, CA, and is available in an IBM PC and an S-100 version. I tested the S-100 version using a Heath/Zenith H-120 computer. The ProTalker documentation doesn't explicitly state whether this board conforms to the IEEE Task 696.1/D2 standard specifications for S-100 bus interface devices; however, it worked fine in the H-120, which conforms to this standard.

The documentation suggests that if

you plan to record and play back long messages (more than about six seconds), you should have two double-sided disk drives and at least 128KB of RAM. Some software is provided with the unit that allows you to record and play back speech. This software consists of an 8088 machine language program for use under PC DOS, ZDOS or other variants of Microsoft's MS DOS operating system, and an interface to Basic.

The ProTalker consists of a board with several jacks located along the top edge. On the IBM PC version, these jacks feed out the back of the computer. There are three miniature phono jacks that are used for audio input and output. One jack is for a low impedance (600 ohm) dynamic microphone (the circuit board can be modified to accept a high impedance microphone instead). The other two jacks provide two types of output, either to an eight ohm speaker driven by the board's built-in 500 milliwatt amplifier or to the auxiliary input of an external amplifier.

There are two banks of switches for configuring the board. On the S-100 version, switch S1 controls the ports where the board is addressed, and switch S2 controls the digitization rate (either two, three or four thousand bytes are consumed in memory per second). However, on the IBM PC version, S1 and S2's functions are reversed. A large, red light-emitting diode serves as a microphone level indicator and a small volume control adjusts the volume of the built-in amplifier.

The hardware design is straightfor-



*Until recently, when microcomputers talked, their speech was mechanical and difficult to understand or limited to certain words or phrases. However, things are changing in the world of computer-generated speech, and Speech Ltd.'s ProTalker may have something to say about where this technology is headed.*

ward; however, a few shortcomings in the hardware design keep me from rating the ProTalker as outstanding.

#### **Those Few Shortcomings**

The board lacks the nylon extractor levers that are standard equipment on Heath/Zenith boards and make board removal much simpler. There are other annoying characteristics as well. The volume control is inaccessible when the board is installed; the digitizing rate is controlled by switch settings instead of being controlled by software; there is no auxiliary input connector for connecting voice sources other than a microphone. The location and orientation of the jacks could cause problems on computers with low clearance over the boards (e.g., the Z-110). Although the board has the capability to be used with a high impedance microphone, it must be sent back to the factory for modification (a switch or even a cut-through trace on the printed circuit board would have been nicer).

One of the most obvious hardware flaws is the lack of on-board buffering of speech data. Using this hardware, your software must devote nearly constant attention to the speech-digitizing chip while speech is being played or recorded. This means that other software-controlled processes such as graphics must essentially stop while speech is being played back or digitized. If the board had a small amount of on-board RAM (say 512 or 1024 bytes), it could be serviced only occasionally (several times per second, say) under interrupt control.

#### **Hardware Setup**

Initial hardware setup is straightforward. My evaluation unit was supplied with a microphone, eight ohm speaker, speaker wire and ¼-inch-to-miniature phone plug adapter for use with the microphone. The switches on the board come preset for port 40H and for digitization at a 6 kHz sampling rate. The circuit board is easily installed in one of the S-100 expansion slots, and the microphone and speaker simply plug into their respective jacks on the board.

The location of the miniature phone plug jacks could cause some problems for owners of the low-profile Heath/Zenith-110 computers. On my installation, the microphone jack required about 3½ inches of clearance above the board. Installation on an H/Z-110 would probably require the use of special right-angle miniature plugs. As I mentioned earlier, board removal is a little tricky since the board doesn't have little nylon lifters to help pop it out. These make it much easier to remove a circuit board from the card cage, especially if the expansion slots are all being used.

#### **Software Provided**

The ProTalker board would be useless without software that lets you digitize and play back speech. Speech Ltd. provides two elementary programs. With both programs, you use your computer as a simple message storage and retrieval system. One version is written in 8088 assembly language, and the other is written in Basic but uses some machine language code that must be patched in (more

about that later). These programs do essentially four things: digitize some speech and save it in RAM, play back digitized speech from RAM, save digitized speech from RAM to disk and load RAM with digitized speech from disk.

When you run the assembly language version, the program first looks on the default drive for a file called TALK1.REC. If it finds such a file, the contents are loaded into memory and played as a message before the main menu is displayed. This is so you can install a spoken prompt into the program.

You are then presented with a menu of five options: R)ecord, P)lay, S)ave, L)oad and E)xit. These let you record and play back messages and save and load them from disk. To digitize a message, for example, you hit the R key and then begin speaking. The maximum duration of your message is determined by the amount of space allocated in the buffer, which in turn is limited by the amount of RAM installed in your computer.

To end recording, you press any key. At this point, the digitized message is stored in RAM and may be played back by pressing the P key or saved to a disk file by pressing the S key. Only one message is maintained in RAM at any time, and pressing R again will write over any old message in RAM.

Both the Basic and machine language versions of the ProTalker software work this way. A third version of the software lets you control the digitization process using an external momentary contact switch. The



ProTalker board contains a two-prong male connector that can be connected to a cable and switch arrangement of your own design, allowing you to control recording via, say, a foot pedal or push button. Using this feature with the ProTalker software, you hit the switch to terminate recording of a message. You can read the status of this switch from the input port and can program it to perform any desired function.

The machine language programs are easy to set up and run. Executable versions (EXE files) of both are provided along with the full assembler source code, which you can use as a guide for developing your own assembly language programs for the ProTalker.

### Basic Interface

Setup of the Basic interface is rather difficult. The procedure is outlined in a 3½-page section of the manual. Essentially, what you need to do is create an overlay file, which contains the machine code to drive the ProTalker but which can be easily loaded from Basic using the BLoad statement. The machine code resides in high memory and doesn't detract from the memory available for your Basic program.

The distribution disk contains an overlay that is set up for a 128KB machine but wouldn't work on my 192KB Z-100; therefore, I went through the lengthy procedure of creating a new one. This process was difficult because there were several nasty errors in this part of the manual. I eventually had to refer to the IBM Basic documentation since the procedure contained in the ProTalker manual isn't described in Zenith's ZBasic documentation.

The Basic interface provides the same capabilities described before: namely, Play Record, Load and Save. These are accessed via a Basic Call statement and provide an easy way to manipulate digitized messages through Basic.

### Performance

The quality of the speech produced by the ProTalker is excellent in comparison to other computer-generated speech boards. When played through the built-in amplifier and a small speaker, the sound quality is equivalent to that of a small tape recorder. To a certain extent, the quality of the sound can be controlled by varying the sampling rate. This is the rate at

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**The quality of speech  
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however, a problem with  
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really isn't of much  
practical use.**

---

which the ProTalker samples and digitizes speech information. The higher the sampling rate, the more perfectly the speech is preserved when digitized. The trade-off here is between improved speech quality and increased storage requirements.

There are three switch-selectable sampling rates of 8 kHz, 6 kHz and 4 kHz, which correspond to data rates of four, three and two thousand bytes per second, respectively. I found that the factory setting of 6 kHz seemed to be a good compromise.

At this sampling rate, each second of speech requires 3000 bytes of storage, thus a typical five second message would take about 15KB of RAM or disk space to store. This is considerably less memory than some previous speech digitization methods have required, although it's considerably more than the simpler phoneme or fixed vocabulary methods require.

The software performed as described in the manual, allowing me to record, save and play back messages. The manual suggests that you use this software to record important messages for each day of the week and then play them back at the beginning of each day. Frankly, this is a pretty silly idea since it's much easier just to make notes or possibly use a small pocket tape recorder.

This points out the problem with the software supplied with the ProTalker; it really isn't of much practical use. I tried recording several short

messages and then calling them up in sequence using the Basic program. The results were disappointing, with the computer taking about the same amount of time to open and read each file as it did to play back the speech. This operation would, of course, be considerably faster when run from a RAM disk; however, I doubt that the phrases would flow together the way I'd like.

### Needs Splicer

What ProTalker needs for software tools as a bare minimum are a splicer program and a program that lets you store many messages in memory at once. The splicer program I'm picturing would let you edit and splice pieces of digitized speech together as easily as a technician might splice magnetic recording tape. Since only a half second of silence in a digitized message can waste 1500 bytes of memory, the ability to eliminate small pieces of dead time could be quite useful. A program that lets you store multiple messages would open up a lot of interesting possibilities. For example, storing a spoken set of numbers would allow you to set up an automated reporting device like a weather station or a telephone call-forwarding machine. Hopefully, programs such as these will eventually be available for the ProTalker either from Speech Ltd. or from outside sources.

### Documentation

The documentation that accompanies the ProTalker consists of a 48-page photocopy of a manual originally printed on a dot-matrix printer. The manual is clipped into an inexpensive manila report binder. The manual pages are 8½ × 11 inches; however, only the upper left six by eight-inch area of each page is used for text, suggesting that the original intent was to produce a smaller IBM-sized manual. The manual chapters include introduction, initial setup, use of the software, setting of hardware options, theory of operation and a schematic diagram of the ProTalker board. There's a table of contents but no index.

Overall, the quality of this manual is poor. The layout is sloppy; there are numerous spelling and grammatical errors, and there are several serious mistakes. The worst mistakes are those in the section on interfacing ProTalker to Basic. Here the manual outlines a six-step procedure where



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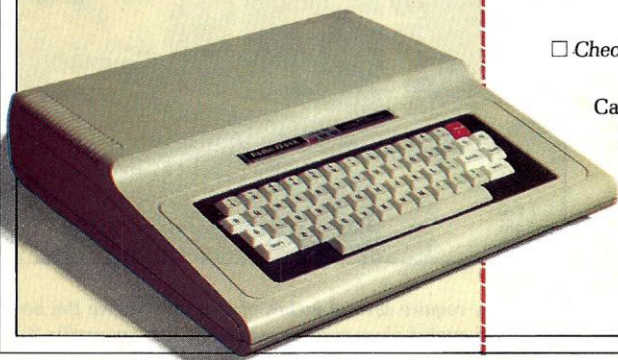
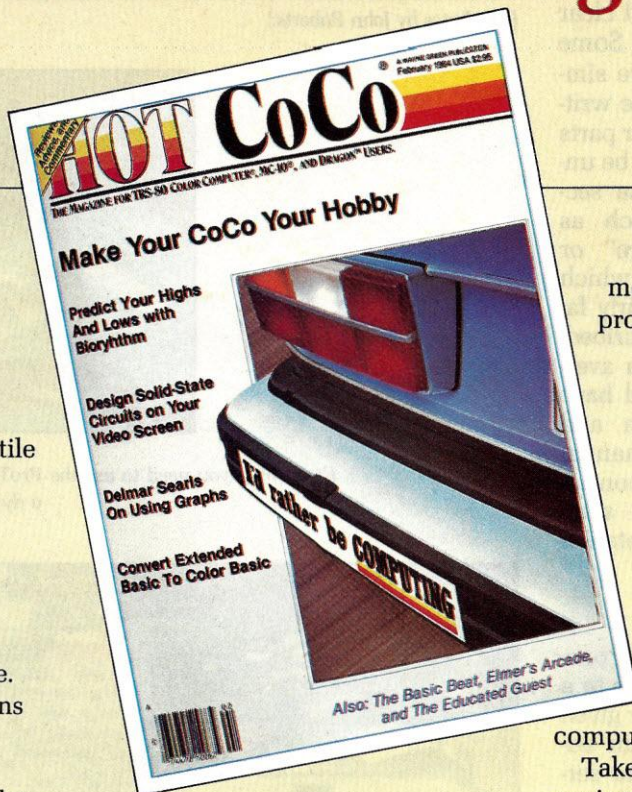
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some steps incorrectly refer to actions taken in previous steps. Another annoying characteristic of the manual is that it's slanted toward users of the IBM PC. Users who are only familiar with the Z-100 may not know that IBM's PC DOS is the equivalent of Zenith's ZDOS or that IBM's BasicA is essentially the same as Zenith's ZBasic. I think that Speech Ltd. should take the time to customize its documentation for each machine that it intends to support.

Another important problem with the user's manual is that it isn't clear who the intended audience is. Some parts of the documentation are simple and detailed as if they were written for the novice user, yet other parts are too technical or too brief to be understood by the novice. These sections contain statements such as "load the ProTalker software" or "assemble the source code," which seem to assume that you're fairly familiar with the procedures described.

By 1979 standards, when an average microcomputer user could have "hacked" through the jargon and typographical errors, this manual would probably have been considered acceptable. By today's standards, however, the documentation fails on a number of counts.

### Support

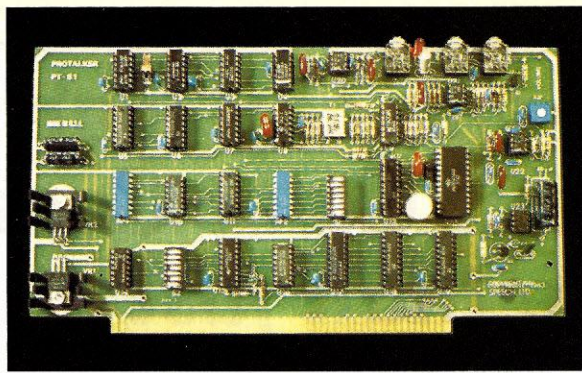
The ProTalker is covered by a one-year warranty that's transferable to a new owner if the unit is sold or given away. The manual includes an address and telephone number for service-related problems. Out-of-warranty service is available at a minimal fee.

Speech Ltd. is attempting to set up an "applications clearinghouse." The intent of this service is to provide a body of public-domain software to ProTalker owners, presumably free of charge. The manual indicates that users have submitted such programs to Speech Ltd.; however, no information is included on what software is available or how to obtain copies.

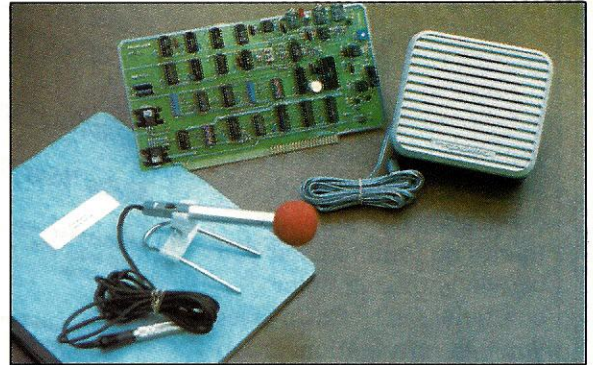
### Impressive Potential

My overall impression of ProTalker is that it's a well-built piece of hardware with impressive potential that can't be fully realized with existing software support.

The hardware design is satisfactory but lacks many features I expected to see in this type of product. The most obvious omission is lack of on-board buffering of digitized speech. A



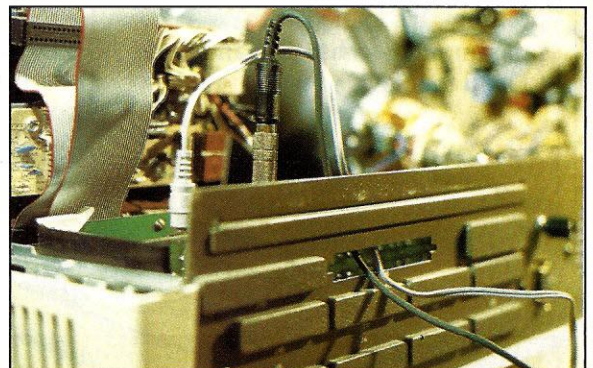
The ProTalker is available in either an S-100 version (shown) or an IBM PC version.  
(All photos by John Roberts.)



Everything you need to use the ProTalker is here. External accessories include a dynamic microphone and eight-ohm speaker.

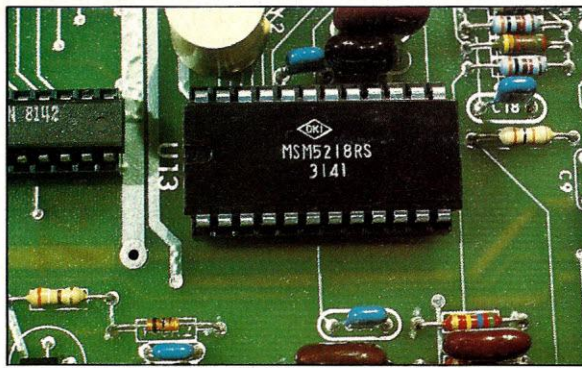


The ProTalker board is easily installed in one of the Z-100's expansion slots.

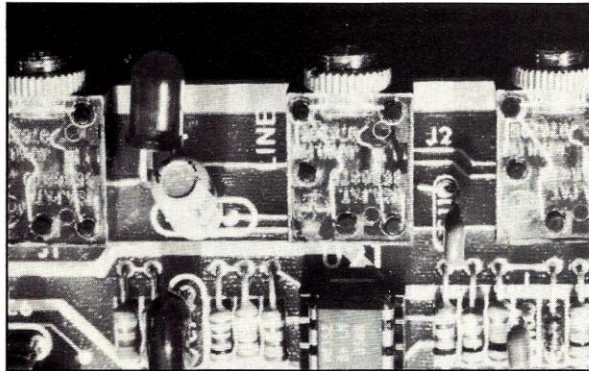


The microphone and speaker plugs may require several inches of clearance above the board. Special angled plugs may be needed on the low profile Z-110.

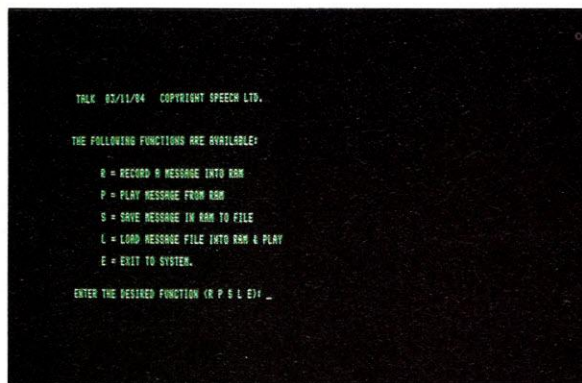




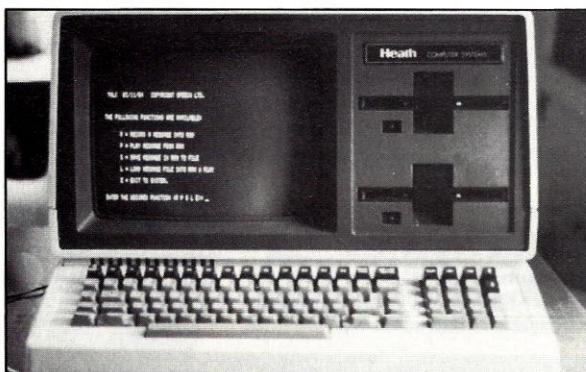
The heart of the ProTalker is the MSM5218 ADPCM chip from Oki Semiconductor.



Subminiature phone jacks provide microphone input and speaker and line outputs. The LED serves as an input level indicator.



The main menu provided by the ProTalker software.



The ProTalker installed and running on an H-120.

512- or 1024-byte interrupt-driven buffer would make this a much more versatile product, especially for animation programs and other software where the speech board shouldn't completely tie up the CPU.

The software support is disappointing. With the software provided, you can digitize and play back brief messages but can't splice messages or keep multiple phrases in memory at any one time. Availability of more powerful software tools for use with ProTalker would open up many interesting and useful applications.

The documentation is also poor. Apparently written by the engineers who designed the ProTalker, the user's manual contains unclear statements, spelling errors and poor grammar—it's generally unprofessional in appearance.

Currently, I'd recommend ProTalker to only the more advanced computer user. The speech quality attainable via the ProTalker is unquestionably among the best you'll hear from microcomputer-controlled speech hardware. At \$325, ProTalker is more expensive than other speech devices, but for many applications, the added clarity of speech makes the extra expense worthwhile.

For now, however, if you really want to take advantage of the full range of capabilities of the ProTalker, you should be prepared to develop some custom software, including low-level assembly language support. With a little ingenuity and some knowledge of computer hardware and software, you can make the ProTalker do some amazing things. ■

Address correspondence to Glenn F. Roberts, 12048 Greywing Square, C-3, Reston, VA 22091.

(Editor's Note: The software supplied to the reviewer uses four-bit samples. Speech Ltd. now supports its board with software that uses three-bit samples. In the 8 kHz mode, this sampling rate requires 25 percent less storage space.)

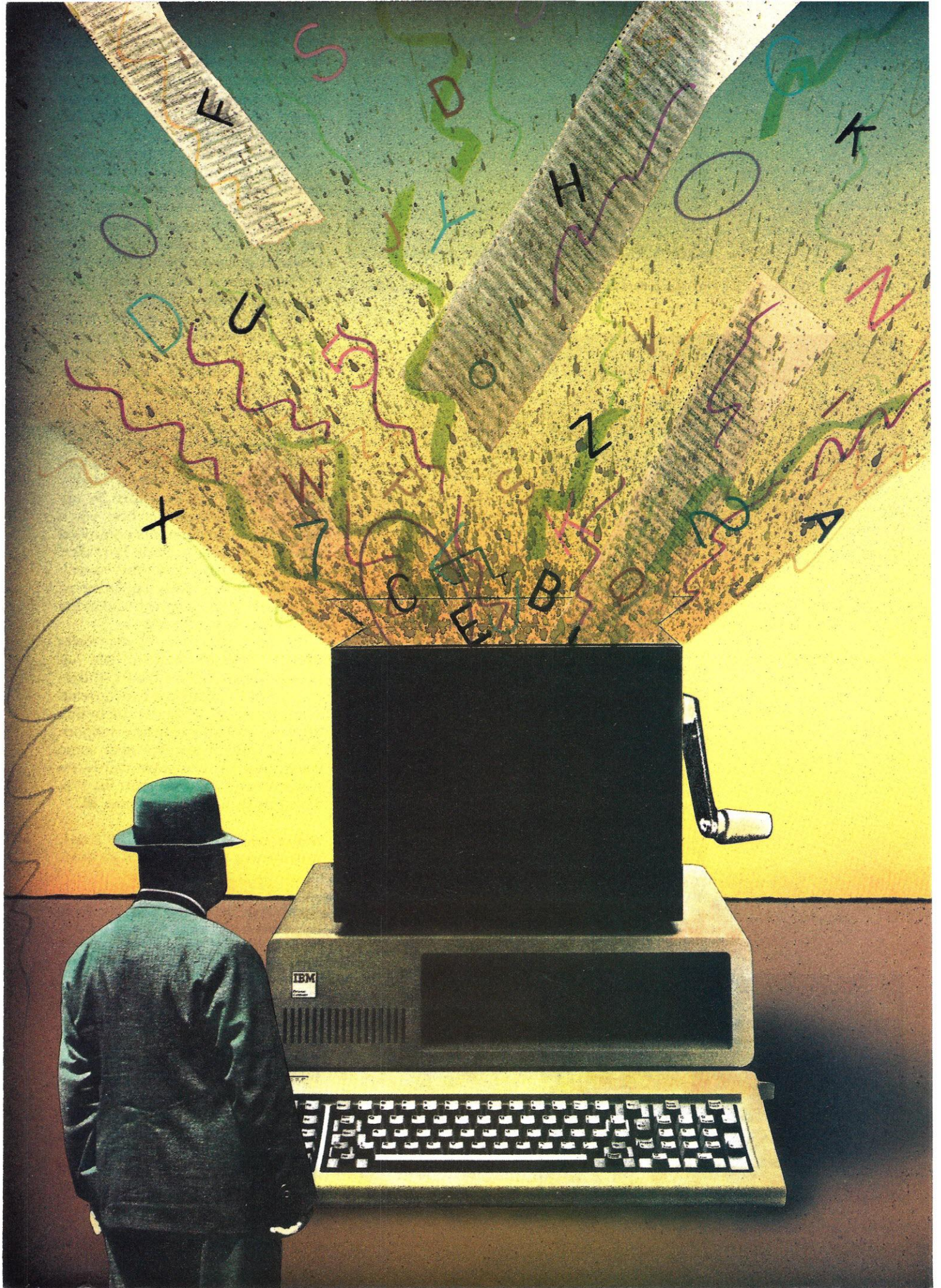
## ProTalker Speech Digitizer/Synthesizer

**System Requirements:** IBM PC or S-100-based system; 128KB; one disk drive (two recommended); either black and white or color display.

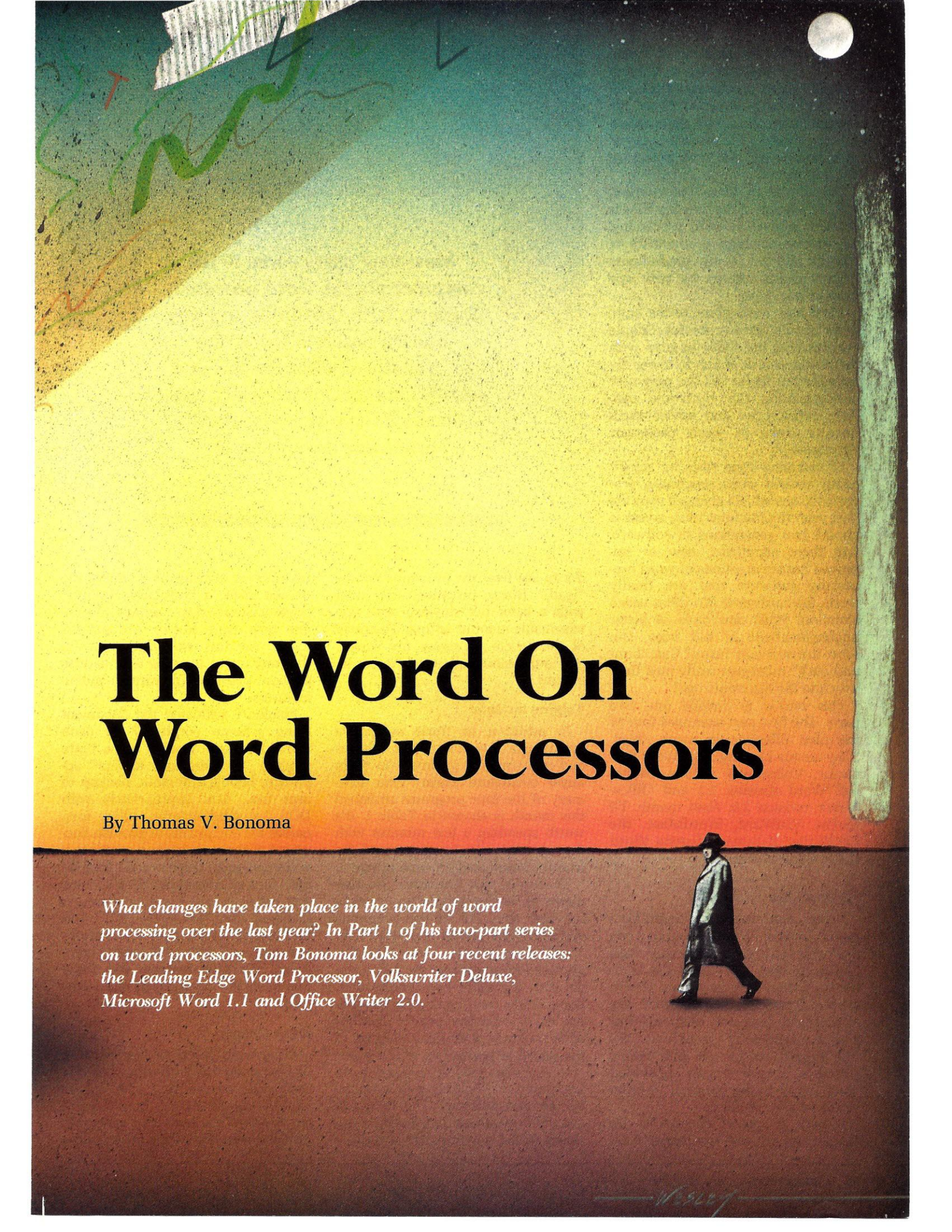
**Manufacturer:** Speech Ltd., 3790 El Camino Real, Suite 213, Palo Alto, CA 94306.

**Price:** \$325.









# The Word On Word Processors

By Thomas V. Bonoma

*What changes have taken place in the world of word processing over the last year? In Part 1 of his two-part series on word processors, Tom Bonoma looks at four recent releases: the Leading Edge Word Processor, Volkswriter Deluxe, Microsoft Word 1.1 and Office Writer 2.0.*



Wesley



Once in a while, it's good to step back and reexamine familiar ground. Word processing is the oldest productivity application for microcomputers. It and the spreadsheet are undoubtedly the reasons many of you purchased microcomputers in the first place.

I'm admittedly biased as a writer; fully 75 percent of the time my IBM is on, it's engaged in word processing. My person-machine productivity is directly affected by any productivity improvements offered by new systems or new ideas.

Most new users come to the computer via the word processor. Simple systems with the ability to grow with the novice can do much to lower the intimidation factor for the new user contemplating the electronic pen. Both experienced and novice users have a stake in word processor development.

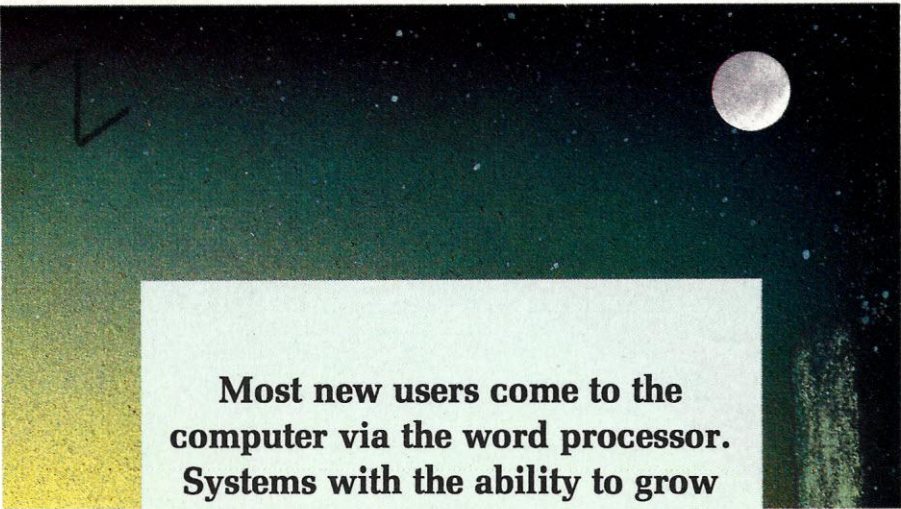
I'll examine nine new or significantly revised word processing programs to see what's changed over the past year. In computer time, a year is almost two generations of software. Are there significant new or improved implementations of word processing software that are finally worth the confirmed WordStar user's attention? What new tools, or better implementations of old ones, can serve the new user better? Can "hunt and peck" managers really pick their way into the electronic age?

This review is divided into two parts. The first part examines four of the nine offerings in some detail. They are the Leading Edge Word Processor, Volkswriter Deluxe, Microsoft Word revision 1.1 and OfficeWriter revision 2.0. Next month, I'll review VisiWord, WordMarc, the EasyWriter II System, Samna Word II and SuperWriter.

## Evaluation Methods

I used each program in depth for a period of time. Where possible, I ran the program both from floppy disks and on an IBM 10MB hard disk in order to assess differences in performance. I attempted to use each feature of each program, including special or "dangerous" commands like File Import or Export, and where possible, I specifically provided "bad" input to the program in order to see what it would do.

I made a special attempt to use longer files (at least ten pages) in or-



**Most new users come to the computer via the word processor. Systems with the ability to grow can do much to lower the intimidation factor for the new user. Both experienced and novice users have a stake in word processor development.**

der to see how the programs handle "load." Many programs are great with a letter but sluggish with any reasonable amount of text. The body of the article expresses my subjective impressions following these evaluations.

## Tabling the Info

In addition to these subjective evaluations, I've compiled a features and requirements summary to make buyer evaluation easier. This summary of the four programs reviewed this month is shown in Table 1. It's worth spending a few minutes with the table in order to understand the features I evaluated for each program.

To begin, the hardware requirements for each program are listed in the first row. All of the programs evaluated this month will work with 128KB of user RAM. Two of the programs allow you to operate with a single disk; the other two require dual floppy disks or a hard disk. Second, the more common printer families each program supports are listed in the legend at the bottom of the table.

Next, I examined the type of learning, fixing and helping aids supplied by the manufacturer. The inclusion of a toll-free number displayed prominently in the documentation and the

presence or absence of a tutorial file on the disks, a book-based tutorial, reference cards, key overlays and on-line help were noted. It's interesting to see the wide differences in the amount of learning and service support provided by various manufacturers.

Finally, I evaluated the document filing scheme employed by each word processor. Does it use a more modern "drawers and folders" approach, handle automatic backup of user files, deal appropriately with DOS 2.x subdirectories, allow long names for documents or provide document abstract sheets and access to a within-program directory display? Or did I face an unfriendly filing scheme that restricted me to an 11-character filename like "MUFFIN.TXT," and find myself barred from subdirectory changing and without a catalog command. It's little features like these that make the job easier or more frustrating.

## Rank Claims

Every word processor manufacturer likes to claim that it offers a what-you-see-is-what-you-get tool. But significant variations exist in how close to printed-page text each package comes on the screen. Variations occur within



each package, depending on the monitor used. I divided the packages into three categories, and when necessary, used a plus or minus sign to shade these evaluations for further discrimination.

A WordStar-like package with only control codes for emphasis and dot commands for format control is the basement level. A first level of on-screen character formatting uses emphases for what the text mode on the IBM can't display: color emphasis for boldface, or some other scheme. Often, word processors in this category can handle on-screen underlining and emboldening on some monitors (e.g., monochrome) but not others. A full-blown what-you-see-is-what-you-get word processor, like Microsoft Word, uses the IBM's graphics screen to fully form graphics characters. In these packages, italics display as italics instead of control symbols or highlighting. And, as a final touch, all the programs accept headers and footers, but it's a rare entry that actually displays the headers and footers on the page as text is input.

### Formatting Features

Next, I looked at document formatting features. I checked whether the system used and permitted multiple format lines (for quotations, single-spaced text amid double and so on), how it handled tabbing and the variety of tabs provided (including such fancy features as dot leader tabs), whether the standard document defined by the system could be modified to serve as a template for all the user wrote, whether on-screen right justification was possible, whether the system offered automatic rejustification of text after inserts, and whether fancy features like automatic hyphenation and widow and orphan control were provided.

You shouldn't conclude automatically that the more of these features, the better, since you may have no need for, say, dot leader tabs (useful in tables of contents).

However, features do measure the product's flexibility, and I looked at them from that point of view. Some features aren't found on the table, since they're common to almost all packages. For instance, the ability to manually insert "ghost" hyphens into text isn't recorded, nor is simple horizontal centering ability. If horizontal plus vertical centering is offered, I noted it, however.

### Cursor Movement

The rows for cursor movement, cut-and-paste abilities and search-and-replace functionality represent the heart of most word processors; they're the features you access most often, whether you're a novice or an expert. Here, flexibility in cursor movement is a virtue, as long as it doesn't lose you at the choice point, trying to figure out whether control, ALT or escape plus the right arrow key goes to the end of the line.

With cut-and-paste operations, it's sometimes desirable to have cursor highlighting of intended cut ranges as opposed to block marking them. Also, some programs allow deletions to be archived and even named for later recall. Others provide a simpler "undo" function to undo the last deletion, and some do neither. Many of the packages provide "super" cut and paste, which allows ranges from the in-memory document to be cut to the disk and disk file ranges to be imported to the working file. A few packages specifically support column manipulations, say for columns of numbers, and some have mathematical capabilities like adding, which can be performed on columns of

numbers. Again, you may find these functions either totally useless or the major reason for buying the package.

### Page Separation

The next two rows deal with splitting the document into pages, a common requirement as most of you don't wish to unroll 40-foot scrolls in the office. Here, I looked at whether the system handles required page breaks, automatic pagination and repagination and has facility for marking and jumping directly to pages of interest.

Sometimes it's desirable to put a piece of identifying text at the top and the bottom of the document, say a title and a page number, respectively. I also examined how the system handles these headers and footers to see whether it permits convenience functions like automatic insertion of the system date. I considered it a plus to display the headers with the typed text on the screen because this gives a better picture of how the page will look. The "where it starts" feature indicates if the word processor gives you an option to display the header and footer on some pages but not on others (like the first page of a letter).

### Accessories

The rows dealing with special functions and special attributes really concern the fancy aspects of each package—the accessories. A case reversal key ordinarily may be useless, but it's priceless the one time you need it. The ability to type in and print out (assuming you have the right hardware) ASCII graphics characters, like little smiling faces, may not seem like much, but line graphics on the PC can be most useful for organization charts and line drawings. Automatic date insertions and the ability to display spaces as dots also





are convenience rather than necessity factors.

Key merge and footnoting abilities may be worth the price of the system, again depending on your needs. Key merge concerns the ability to store repetitive keystrokes, like a macro capability, but also lets you insert your own keystrokes during program execution. Most of you couldn't care less about the ability to footnote on the bottom of the page, but some wouldn't buy a system without this feature.

### Mixed Bag

The print row is a mixture of necessities and luxuries. In the necessity category are pitch control, page length specification (e.g., for mailing labels), lines-per-inch controls and pagination specification (e.g., print pages 1, 2 and 4, but not 3). In the luxury category are the presence of a spooler, which allows simultaneous printing and editing; sheet feeder capabilities; and "weird" spacing (one and one eighth lines, for example).

The final rows concern extras. In the first row, I deal with whether or not a mail-merge program is provided with the package and whether or not it's flexible. The second row concerns whether or not a spelling checker is provided and how it functions. The third deals with passing files to and from other programs.

### Warning: Incomplete

I tried to offer an at-a-glance view of each system based on these criteria. Nonetheless, you shouldn't regard the table as complete—some packages do things not covered there and others do the functions reported in a novel manner. It's necessary to read the text accompanying each program as well.

## Leading Edge Word Processor

It's tempting to be hard on a company that advertises as brashly as Leading Edge does, but its LEWP has the potential to be the best news in word processors this year, with the exception of Microsoft Word. I say "potential" because right now LEWP has a fatal bug that makes the system unacceptable for use.

LEWP is a quality word processor that does almost anything you'd want, as the table shows. Among its many benefits is one of the best manuals I've seen, which relies heavily on pictures and icons instead of reference

sections. While the manual leaves out some important information (for instance, to use the Mode command in order to employ a serial printer), generally, it's clear. The novice user will be up and running almost as quickly as with Volkswriter Deluxe.

### Good Value

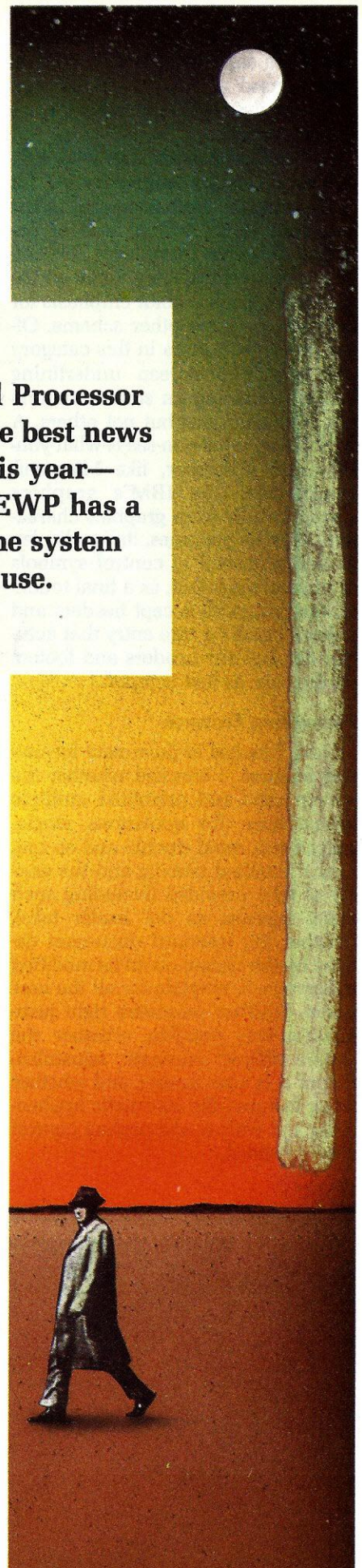
The program seems to make a fetish out of providing value for your

**The Leading Edge Word Processor  
has the potential to be the best news  
in word processors this year—  
except that right now LEWP has a  
fatal bug that makes the system  
unacceptable for use.**

money. A good on-line help facility is available, and a keyboard overlay makes it easy to recall even the more complex commands in LEWP. The disk filing system is one of the most welcome and advanced features of the program. Instead of eight-character filenames and drive prefixes, the package organizes documents into folders (related topics) and drawers (the disks), and allows use of 30-character names. The filing screen tracks time and date of last revision and of creation as well. This system is on par with the advanced filing rubrics of VisiOn; one of the best I've seen for a word processor.

The program is engaged and directed through a set of menus that beg for mouse integration; here's an obvious application for Microsoft's new mouse drivers, which allow you to run "outside" software with a mouse. The menu choices are clear and coherent but become tedious because LEWP follows its simplicity/clarity scheme to an extreme.

To highlight a word in bold, for instance, you must call up the special functions menu (one keystroke), choose the type of highlighting to be done (another), choose from the subtypes of this highlighting available (bold, double wide and double wide and bold) and then apply the function to text through yet another menu





choice and keystroke set. As you become more familiar with the system, this becomes tiresome but it does do the job.

LEWP has a particularly extensive set of procedures for cutting and pasting, including the ability to name cuts and recall them at will, the ability to archive deleted blocks automatically (transparent to the operator) and to get them back as needed, a glossary function that allows frequently used keystrokes to be saved in a separate file and even a transposition key for those oops instances when you type "hte."

### Key Feature

Equally impressive for the advanced user, LEWP has a kind of "key merge" ability callable from a function key menu. Here, you can automate certain LEWP commands (say, a search and replace) and have the ability (much like a ProKey program) to insert your own keystrokes into the otherwise automated process at certain points. For instance, a secondary merge document could be built in this way. Also, from the same function key menu, you can insert the system date (in three different formats), time (in two formats) and other goodies into the document being typed.

While LEWP is impressive, it's also uneven in operation. Most functions, like text entry, insertions and the like, work quickly and well, with a kind of snap I associate with excellent design and coding. Other functions, however, are torpid. Search and replace, for instance, at least when invoked globally, is slower than watching your dog grow old and can easily be beat with manual methods.

### Fatal Bug

The real problem with LEWP is a fatal bug that can result in a certain loss of data. Never, ever type dash (ASCII 195) in LEWP when right justification has been chosen. The system will lock up, lose data and require a cold reboot to restart the computer. How it is that a program could be on the market with a bug like this is beyond me.

When I called the LE 800 line to ask about the problem, the staff was aware of it and simply said that they'd been having a lot of trouble with justification and hoped to remove the bug in the next revision. If LEWP were a car, it would be re-

called for a life-threatening safety defect, and you shouldn't purchase it until this serious flaw is remedied.

Other than this, LEWP is a joy to use and has a flexibility that suits both the novice and expert user. The novice will find the book-plus-disk tutorial a quick way to text entry with LEWP. The expert will find the program's abilities to print in color (with a Prism printer), do proportional spacing (which works well) and the other features I've mentioned to be a real godsend. This program, when it's cleaned up, is going to be a dynamite seller.

### Microsoft Word

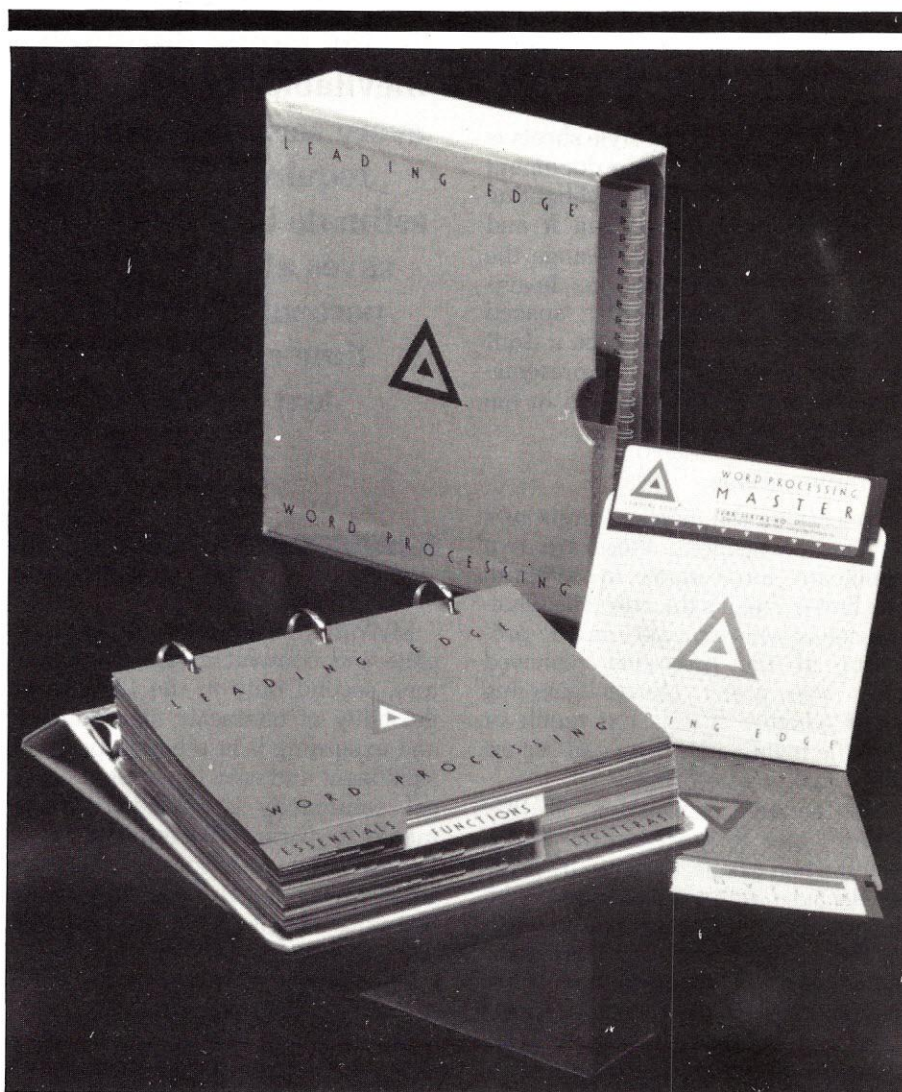
I've reviewed MWord in version 1.0 before in this magazine. It's no secret that I have a high opinion of this word processor and that it's my personal program of choice for manuscript typing. Although I'll try to be

objective, this review is colored by the fact that I've written a book on MWord and have had daily experience with the program over a number of months. Also, note that I said I use MWord for manuscript typing: ordinarily, I don't write letters with it and prefer a folder and document filing scheme for high-volume numbers of small files, such as letters and memoranda.

Microsoft Word does little poorly and quite a number of things uniquely well. Three of the latter that stand out are mouse integration, the style sheets for document formatting and the screen display itself.

### Mouse Facts

Regarding the mouse's integration into Word, little can be done from the keyboard that cannot be done with the mouse, too. I wouldn't give you a nickel for MWord's mouse (or any other mouse) during the text entry



The Leading Edge Word Processor offers a low price, good documentation and a fatal bug.



phase—the actual writing. This is sheer keyboard activity.

But I wouldn't take \$1000 for the mouse during the inevitable revisions and more revisions that every serious document requires. Here, the mouse is a joy that permits keyboardless highlighting of text, subsequent moves, deletes and the like. My best estimate is that a mouse saves nothing on text entry but about 20 to 25 percent of the total time required for each text revision.

### Style Sheets

Concerning style sheets, an innovation of Microsoft Word is that the appearance of a document, including keystrokes used to change it, tabs and even page layouts, is totally divorced from the text of the document itself. You create or modify one of the Microsoft-supplied style sheets for each document you write, and you can change these at will. The style sheets permit automatic control of format aspects of a document that would otherwise be incredibly complex, such as tabular layouts and automatic outlining.

But the real benefit of style sheets is that it's possible to type a document in double-spaced, light-highlighting draft form, print it and edit it and with a single command, change the style sheet to two-column, heavy-highlighting, proportionally spaced text! So the same text can be a draft and a document suitable for presentation with no mucking around in the text to change things.

### Two Innovations

Concerning the display format and screen management, there are two significant innovations in MWord. The first is that it's the only true what-you-see-is-what-you-get word processor of the programs reviewed here. You aren't always guessing about whether there's too much or too little highlighting; you can see exactly what you've chosen.

The second innovation is that MWord goes to great lengths to display the text precisely as it'll be printed. Because the program works with the graphics screen of the PC and XT, 1½ line spacing can be indicated visually, as can ⅓ of a line (within display resolution constraints). Again, the net effect for you may be zero, but I save on the continual printing and reprinting of drafts that I often go through with other packages. A

rough draft and a final is all I need with MWord.

MWord has many other elements, such as a glossary function, the best footnoting capability on the market, flexible headers and footers and a marvelous help function, but I'll concentrate here on the revisions that have been made to MWord version 1.1. These include some fixes from reviewers' complaints (including mine) to version 1.0. For example, slow disk reads and writes are speeded up significantly in 1.1, as is document repagination. Some small bugs are cleaned up, and some simpler user interfaces to minor program facets are improved. The major benefit from MWord 1.1, though, is its new merge function.

---

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time required for  
text revision.**

---

### New Merge Function

MWord 1.1 has an especially complete and competent text merge feature, second only to the LEWP's in flexibility of character manipulation and exceeding it in other respects. A significant and easy to use set of logical commands is included in the merge to permit the application of Boolean and other logical operators so that you can include or exclude text on the basis of whether a record meets certain conditions.

For instance, there is a good if...then...else programming capability, an instruction to set a date to the system default for all records, the ability to enter text when the form letter is printed and a number of other

commands. The result is a much more flexible and useful word processing program than version 1.0.

One final word on MWord's interface with printers. If you're fortunate enough to have one of the many printers MWord is configured for, you'll find it jumping through hoops you didn't know were there. If you don't have a supported printer, and the Microsoft people haven't supported some pretty common hardware like the IDS Prism, you're in trouble. Though there is an appendix that tells you how to construct a print configuration file for any printer, I defy anyone but a full-fledged assembly programmer to implement it! Nevertheless, MWord is a great package overall.

### OfficeWriter

OfficeWriter just begs to be dismissed as a poor man's MultiMate, but that doesn't do justice to what the Office Solutions people have accomplished with this program. OW, in revision 2.0, at least, is a competent "knock off" of the Wang word processing system that offers a simplicity not found in MultiMate and, as the manual says, offers a system that "can be used productively in minutes and mastered in a few hours."

OW requires 128KB of main memory under DOS 1.1 and 192KB under DOS 2.0 and above. The system supports hardware with as much as 640KB of RAM, however, and in this case will edit a 274-page file fully in memory. With the minimum system, about 44 pages will fit—a useful size. OW has a tutorial program as well as some sample files and is supported by a key template, a ruler for figuring out pitch and lines per inch, and a good manual, which is simple and thorough. The support add-ons are thought out well.

### Short Menu

OW works from a short five-choice main menu that makes you wonder if something isn't missing. It isn't, it's just part of the simplicity of the human interface in this program. You invoke most of OW's functions from the PC function keys; others, such as advanced cursor movement, use the ALT key to modify the actions of other keys, such as a cursor arrow. The program is tolerant of extra-wide documents up to 156 characters in width. Since, as in MultiMate, print



options are stored with each document, each piece of writing is a work that stands alone for revisions and production and can be fully customized.

### Codes and Features

All special codes, such as those for underlining, bolding and paragraph returns, are denoted by symbols as opposed to any on-screen modification of the displayed characters themselves. This means that at first you have to learn a somewhat bewildering array of little houses and the like, but you soon find their meaning becomes second nature. Like its competitor, MultiMate, OW is a page-oriented text editor. That is, the system is more similar to a pen and paper concept than to the older, and more frequently seen, "infinite scroll" concept of other word processors. Up to three lines of headers and footers can be put on each page of text.

OW supports more than the basic set of fancy features, like super- and subscripting, sheet feeder control for printers, a print spooler and document summary screens. Also, there's a good facility for converting documents to and from OW's format, and another for converting ASCII documents directly (say, those emanating from a dBase or other data processor) to OW's secondary document format, or merge files.

OW has an unusually extensive set of conditional logic commands included as part of its text merge feature. For example, you can boilerplate paragraphs and choose field inclusion/exclusion on the basis of logical equivalence, not equals, greater and less than and the like. This feature means that the repetitive user who needs to create documents that respond to an if...then set of inputs ("If Herbie gave more than \$1000, then include paragraph #34") can construct exceptionally complicated documents with little input.

There's little to criticize in OW, at least in revision 2.0. It's a solid program that does a good reliable job uncomplainingly and thoroughly. Perhaps its best feature is what others may call its "lowered functionality" when the inevitable comparisons with MultiMate are made. This "lowered functionality" leaves out certain frills, it seems to me, so you can buy the benefit of quicker learning time and simpler operation. That's not at all bad.

## Volkswriter Deluxe

Volkswriter, which has gone through several major revisions in its old form, including an international language release, now has new stripes as Volkswriter Deluxe. It's the same old program, all right, but significantly enhanced with a number of new features that make it even more useful than before.

If you're not familiar with earlier versions of this program, VX is an aptly named vehicle for word processing. It uses a combination of screen menus, pop-up menus, in-text commands and function key calls to do a creditable word processing job, though it has some limitations for the expert user.

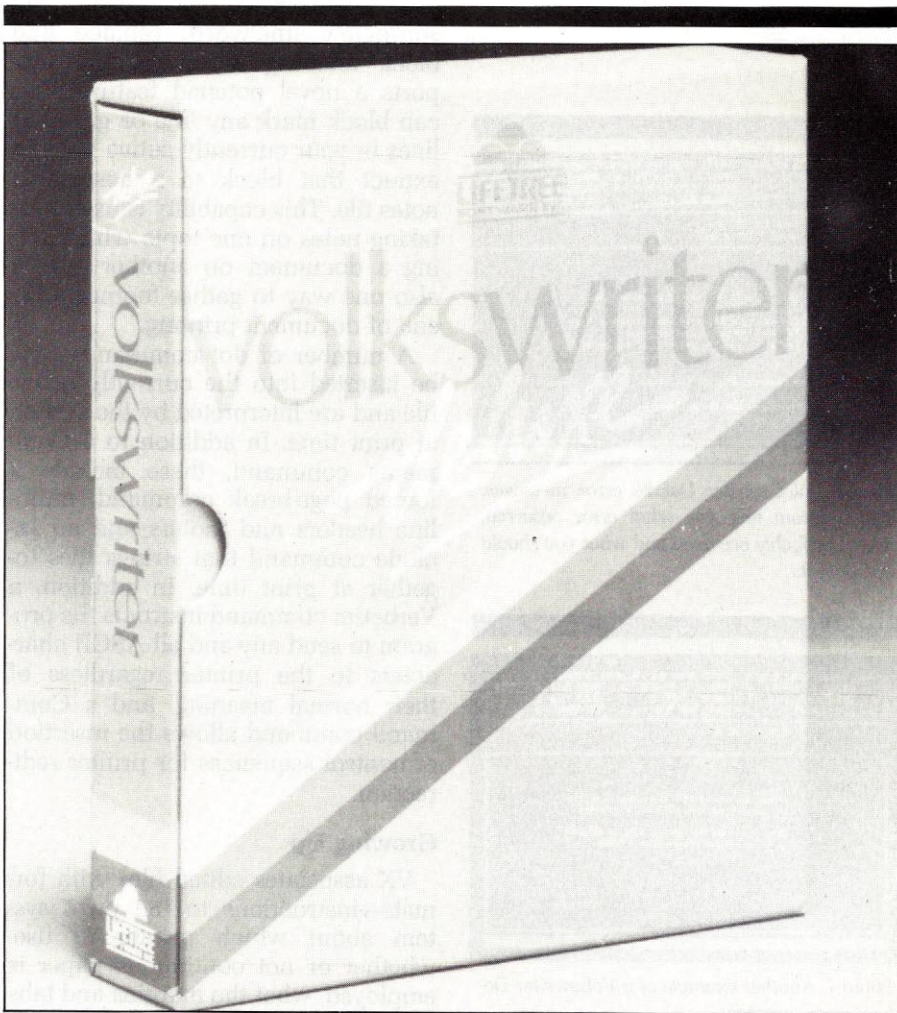
VX is supplied on a single disk with a disk tutorial as well. The program self-configures with a little help from you for floppy disk or hard disk operation on either a monochrome or color monitor. You make color selection at configuration time. The program requires 128KB RAM, a printer and little else (see the table).

It handles files of up to one megabyte in length, due to the use of a virtual memory facility implemented by a disk spill file. The program takes advantage of as much RAM as you've installed as well, avoiding unnecessary disk operations. A line of text in VX may be up to 250 characters long; DOS 2.0 pathnames are fully supported.

### Menu Items

The main housekeeping menu in VX has file manipulation commands, text handling commands and special commands. Any disk can be cataloged from the main menu; any file can be renamed or deleted. Similarly, word processing files can be created, retrieved, stored or edited at the push of a single key. Special commands invoke VX's new text merge feature, a simple but effective mail-merge facility added to the new program release, and other features.

The editor, where most of you will spend your time, is partially a what-you-see-is-what-you-get editor and



Lifetree Software has souped-up its Volkswriter. The result: Volkswriter Deluxe.



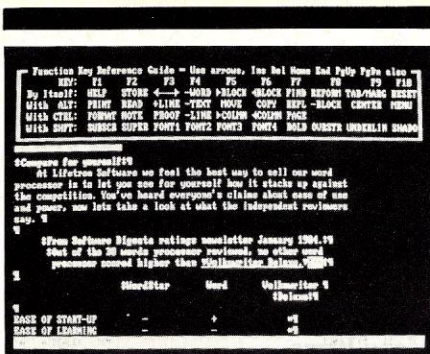


Photo 1. Volkswriter Deluxe at work. Here, the function key assignments have been displayed by typing F1, the help key.

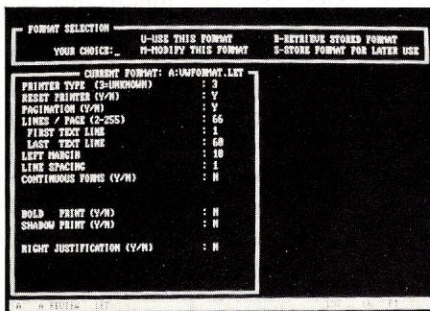


Photo 2. Volkswriter Deluxe's format selection menu. This menu lets you define the format of your document.

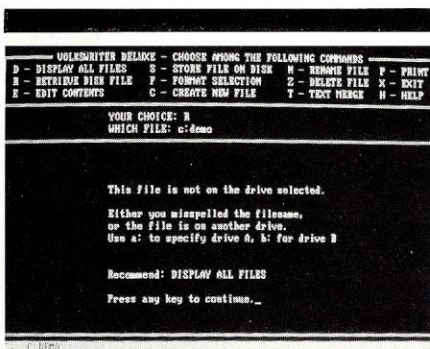


Photo 3. Volkswriter Deluxe error messages. The program tells you what error occurred, why it probably occurred and what you should do about it.

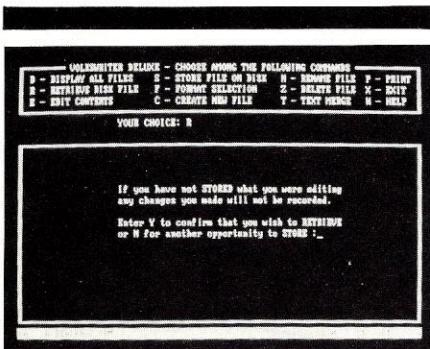


Photo 4. Another example of a Volkswriter Deluxe error message.

partially an inserted command one. VX has quick cursor moves and a good key layout for making them. VX makes heavy use of the function keys, both unshifted and shifted in CTRL, ALT and SHFT combinations. It uses 37 of the possible 40 combinations for one thing or another.

A number of VX's "main menu" functions can be called from inside the editor; for instance, text may be printed; formats may be changed; files can be stored or merged with the currently edited text; and a pop-up menu reminding you of the function keys' definition may be called.

Text manipulation keys include special formatting ones for super- and subscripting and other type styles (up to four special fonts may be called from the function keys, plus four more for boldfacing, underscoring, overstriking and double strike printing). A proof key removes VX's special formatting symbols so that text may be viewed in a fashion more similar to the way it will be printed.

### Notepad Feature

In addition to the normal insert/delete line/word, replace and block marking functions, VX supports a novel notepad feature. You can block mark any line or group of lines in your currently active file and extract that block to a designated notes file. This capability is useful for taking notes on one topic while editing a document on another and is also one way to gather footnotes for end of document printing.

A number of dot commands may be inserted into the currently active file and are interpreted by the system at print time. In addition to a Comments command, these include a forced page-break command, multi-line headers and footers and an Include command that strings files together at print time. In addition, a Verbatim command instructs the program to send any and all ASCII characters to the printer regardless of their normal meaning, and a Command command allows the insertion of control sequences for printer redirection.

### Growing Up

VX associates edited files with formats—instructions to the print system about which printer to use, whether or not continuous paper is employed, what the margins and tabs are for the current document and what character spacing and line

spacing are to be employed in the printout.

VX, an anomaly among the less expensive word processors, shows it has come to maturity by supporting full proportional spacing on eight of the 19 printers supported by the system. These include the popular Epson FX-80. Print formats can be changed within a document, a feature that allows multiple margination, line spacing (in whole increments only: no 1.5 allowed) and character spacing (10 to 12 cpi, for example).

A major addition to the VX program is the text merge function, which combines a base document with a data file to produce customized correspondence. The system uses a backslash as the command character to delineate variables and limits each variable set (record) to 250 characters.

VX has grown up. It's a full-fledged word processor now, not a substitute for an EasyWriter I that wouldn't work when the PC was first released. Therefore, it's judged against tougher competition and criteria. Certainly, the feel of the system is marvelous: crisp, uncluttered and uncompaining.

The ability to access all 255 ASCII codes from the keyboard and text merge as well as the notepad are good value-added features. The system does all that's asked of it cleanly, and little fault can be found.

### Wish List

In the wish list category, the program should do on-screen right justification of text to move closer to the now expected display-as-printed standard. This is a moderately serious shortcoming in my opinion. Another equally serious shortcoming is the lack of automatic on-screen reformatting when text insertions are made. This capability should be standard in any word processor in the 1980s.

Adding cursor moves by sentence and paragraph as well as by word and line would be another welcome item, as would highlighting that allowed block marking by cursor pointing instead of inserting beginning and ending block symbols. The program provides no footnoting capability or spell checking (but VX works with many spelling checkers).

However, these last complaints are just nit-picking and asking VX's designers for things they probably had no intention of providing. There's little to complain about in the VX



Feature		Leading Edge 1.1	Microsoft Word 1.1	Office Writer 2.0	Volkswriter Deluxe 1.0
<b>System Requirements</b>		128- or 256KB, Mono/Color 2 DSDD or hard	128KB Mono/Color/ Hercules 1 SSSD/DSDD or hard	128KB, DOS 1.x; 192KB, DOS 2.x Mono 2 floppies; A: DSDD or hard	128KB Mono/Color 1 floppy or hard
<b>Printers Supported (see legend)</b>		1-5	2, 4, 5-15	1-4, 6-8, 11, 13, 15-17	1-18 plus auto- matic typewriter
<b>Documentation Features</b>	Disk Tutorial	•		•	•
	Book Tutorial	•	•	•	•
	Reference Card	•	•		
	Key Overlay	•	•	•	
	On-line Help	•	•	•	•
	Toll-free Number	•			
<b>Filing Scheme and File Access</b>	Drawers (disks), Folders and Documents	•			
	Automatic Backup	•	•		•
	DOS Subdirectories		•		•
	Long Names	•			
	Document Summary Sheets			•	
	Directory Display	•	•	•	•
<b>Display</b>	WordStar-like Codes			• + centering only directly displayed	• user
	Highlight	• with headers			• choice
	Fully Formed Graphics With Headers, Notes		•		
<b>Formatting Features</b>	Multiple Format Lines	•	•	•	•
	Tabs and Decimal Tabs	•	•	•	
	Right Justification Tabs	•	•		
	Standard Defined Document	•			•
	On-screen Right Justification	•	•	•	
	Automatic Reformat	•	•	•	
	Automatic Hyphenation				
	Widow and Orphan Control	•	•		
	Dot Leader Tabs	•	•		
	Indentation	•	•	•	•
	Vertical Centering	•			
<b>Cursor Movement</b>	By Character	•	•	•	•
	Screen	•	•	•	•
	Word	•	•	•	•
	Line or Edge	•	•	•	•
	Sentence	•	•	•	
	Punctuation	•	•		
	Page	•	•	•	•
	File	•	•	•	•
	Paragraph		•	•	
	Mouse and Thumbing		•		
<b>Cut and Paste</b>	Block Delete	•	•	•	
	Archive Delete	•	•		
	Block Insert	•		•	
	Glossary	•	•		
	External Copy	•	•	•	
	Windows	•	•		
	Transposition	•	•		



		LE	MW	OW	VX
	Normal Move/Copy	•	•	•	•
	Column Moves, Math			• no math	•
	Undelete	•	•		•
<b>Search and Replace</b>	Global	•	•	•	•
	Discretionary	•	•		•
	Wild Cards	•	•		
	Case Ignore	•	•		
	Directional		•		•
	Whole Word Only	•	•		
<b>Pagination</b>	Required Breaks	•	•	•	•
	Automatic Breaks	•		•	•
	Automatic Repage	•	•	•	
	Goto Page	•	•	•	•
	Place Marks	•			
<b>Headers, Footers</b>	Multiline	•	•	• 3-lines maximum	
	Alternating	•	•	•	•
	Automatic Page	•	•	•	•
	Automatic Date	•		•	
	Display with Text	•			
	Where It Starts	•	•	•	•
<b>Special Functions</b>	Case Reverser	•			
	ASCII Graphics	•	•		•
	Automatic Date Insertion	•		•	
	Key Merge	•			
	Auto Time Insertion	•			
	Spaces-as-dots	•		•	
	Footnotes at Bottom		•		
	Footnotes at End		•		
<b>Special Attributes for Characters</b>	Underline	•	•	•	•
	Double Underline	•	•		
	Bold/Shadow	•	•	•	•
	Expanded	•		•	•
	Italics	•	•		•
	Proportional	•	•	•	•
	Color Support	•			•
	Super/Subscript	•	•	•	•
	Compressed			•	•
	Overstrike		•	•	
<b>Printing</b>	Default Format	•		•	•
	Spooler	•	•		
	Abort	•	•	•	•
	Pitch Control	•	•	•	•
	Page Length	•	•	•	•
	Lines per Inch	•	•	•	•
	Hot Print	•		•	•
	Sheet Feeder Control		•	•	
	Page Start/Stop	•	•	•	
	Multiple Copies	•		•	•
	Odd Spacing		•		
<b>Mail Merge Printing</b>	Has Feature	•	•	•	•
	Read ASCII	•	•	•	•
	By Field	•			
	By Word in Field	•			



		LE	MW	OW	VX
	By Character in Field	•			
	Forms Support				
	If...then Programs		•	•	
	Include Command		•		•
<hr/>					
<b>Speller</b>	Has Feature				
	Third Party Offerings		•	•	•
	In-text Correct				
	User Dictionary				
	Big Dictionary				
	Thesaurus				
<hr/>					
<b>Communications/ Import and Recover</b>	ASCII to WP	•	WordStar to	•	No need,
	WP to ASCII	•	Word only;	•	all ASCII.
	DIF		Works with		
	Document Recovery	•	ASCII files too.		

#### Printer Legend

- |              |                      |                     |
|--------------|----------------------|---------------------|
| 1. Prowriter | 7. Epson FX          | 13. Diablo 630      |
| 2. IBM       | 8. Okidata Microline | 14. NEC 77 xx       |
| 3. Prism     | 9. Okidata Pacemark  | 15. Qume Sprint xx  |
| 4. NEC 35 xx | 10. TI 850           | 16. Brother         |
| 5. Generic   | 11. Toshiba P1350    | 17. Smith-Corona    |
| 6. Epson MX  | 12. Starwriter       | 18. Mannesman Tally |

system, and everywhere you turn good news is encountered.

For example, the search function has an automatic reverse feature. If you search at the end of text for something higher up, the program will find it automatically. There's a temporary indent key for quotes, a hard space facility and now, marked page breaks in the text as there should be.

I can make two fair statements about this system. First, VX has grown up in a way that should make its parents proud. Second, as the designers claim, the major advantage of VX is that in a short time you can be comfortable with the system and concentrate on what you're writing, not on what the computer's doing!

Because I was concerned about my own ability to evaluate VW Deluxe, I gave the program to a family member who had just acquired a Portable Personal Computer and was mildly computerphobic. In one hour's time she had produced a set of notes for a report. VX, clearly, is a useful system for the novice with some power to spare for the intermediate user.

### Conclusion: Part I

Several apparent trends will bear further examination as I look at more programs in Part 2 of this review.

One is that a number of manufacturers finally seem to be dealing with the conflict of ease of learning for novices with significance of function for experienced users.

Another is that the world of word processing clearly is moving toward what-you-see-is-what-you-get. It's the rare program that still uses control codes and block marking.

A third trend suggests that, with a few exceptions, there just isn't that much that's changed from last year to this or from the PC's introduction to the present. The confirmed WordStar user might be converted by a Microsoft Word but probably would sneer at a number of the offerings above and say "What does it do I can't do?"

That question, though, would miss the point, because the advances that have taken place in word processing since 1979 have more to do with *how* things are done than with any change in *what* is being accomplished. I'll come back to some of these issues in Part 2. ■

Address correspondence to Thomas V. Bonoma, 45 Drum Hill Road, Concord, MA 01742.

### Products Reviewed

Leading Edge Word Processor  
\$100 (\$150 with MailMerge)  
Leading Edge Products Inc.  
225 Turnpike St.  
Canton, MA 02021

Microsoft Word revision 1.1  
\$375 (\$475 with mouse)  
Update kit for owners of  
version 1.0, \$25  
Microsoft  
10700 Northup Way  
Suite 200  
Bellevue, WA 98004

OfficeWriter version 2.0  
\$325  
Office Solutions Inc.  
5708 Odana Road  
Madison, WI 53719

Volkswriter Deluxe  
\$295  
Lifetree Software Inc.  
411 Pacific St.  
Suite 315  
Monterey, CA 93940



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# Late-Breaking News: IBM's Guns of August

By Eric Grevstad  
Senior Writer

*Since the PC's rise to predominance, the industry has had its sights set on IBM. Now with AT&T and Compaq aiming their new weapons at Big Blue, IBM has added to its arsenal. With the introduction of the PC AT (for Advanced Technology), IBM is threatening to blow competitors out of the water.*



IBM's heavy-hitting artillery: the PC AT sports an Intel 80286 microprocessor, 256KB RAM, a 1.2MB drive and IBM's impressive track record.

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**IBM** traditionally takes some time getting the bat off its shoulder, but when it does, it starts breaking heads. For some months before August 14, critics had accurately described the IBM PC as a relic compared to newer desktops like the Compaq Deskpro and AT&T 6300. For some weeks, rumors had flown about a Big Blue counterattack, timed to coincide with a "third birthday party" for the PC and dealers in Dallas. The party wasn't as showy as "Apple II Forever," but the counterattack was devastating.

The centerpiece in Dallas—and at a press showing in New York given on IBM's usual 24-hour notice—was the Personal Computer AT (for Advanced Technology), a desktop built around Intel's 80286 microprocessor.

According to the Intel catalog, the 286 has six times the performance of the 8086 that Compaq and AT&T use; with its 24-bit address and 16-bit data path (compared to 16 and eight, respectively, for the PC's 8088), it can address 16 megabytes of memory for multi-user, multitasking operations.

The AT doesn't go that far. At its 6 MHz clock speed, the 286 is practically idling despite IBM's promise of PC applications running two to three times faster. The base AT (\$3995) has 256KB RAM, the enhanced model (\$5795) twice that; there's space for another 128KB, for a PC- or XT-compatible 640KB total, on the motherboard.

Past that, buyers can add up to five 512KB expansion boards (\$1125 each), peaking out at three megabytes of RAM—made of 64Kb chips stacked in pairs, which surprised sages who expected IBM to use the newer 256Kb units. A hefty 192-watt power supply and a variable-speed, temperature-controlled cooling fan keep things running.

### **Massive Mass Storage**

Most compatibles' 40-track, 48-tpi (tracks per inch) disk drives fit 360KB into 5¼ inches; the quad-density drives in Tandy's TRS-80 Model 2000 hold 720KB. The PC AT tops them all: its 80-track, 96-tpi drive packs 15 instead of nine sectors per track and spins at 360 instead of 300 rpm, cramming 1.2MB onto an "HC" (high capacity) disk (supplied, naturally, by IBM). The drive can read existing 360KB floppies, but once it writes on

one, the disk can be read only by an HC drive.

The base AT has one 1.2MB drive; the enhanced version, with six instead of seven free expansion slots, adds a 20MB hard disk located amidships. That leaves space below the floppy drive for a third drive—a 360KB floppy to run old PC disks, a second 1.2MB floppy or a second 20MB Winchester.

There are other hardware options—most existing PC add-on boards, plus two new items. Number crunchers will rave about the Intel 80287, the bigger, faster brother of the 8087 math coprocessor, and nearly everyone will appreciate IBM's new serial/parallel adapter, which supplies both RS-232C and parallel ports

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**With gossip rampant  
that Big Blue would  
drop Microsoft and  
launch a proprietary  
operating system, the  
AT introduction  
starred not one but  
two Microsoft systems.**

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with one slot. The adapter's standard on the enhanced AT, though IBM's kept its ignoble tradition of leaving interfaces off its base models.

### **Screens, Keys and Software**

The competition's still ahead of IBM in one respect: the AT takes today's monochrome and color PC monitors and adapters, meaning its graphics are no better than before. However, one thing's much better—the AT's keyboard, which retains the basic PC layout but fixes its notorious problems. The backslash, tilde and escape keys have been conveniently moved, allowing for decently sized and located shift keys and an enter key big enough to hit with your elbow. There are lights for the shift, number and scroll lock keys.

And, with gossip rampant that Big Blue would drop Microsoft and launch a proprietary operating sys-

tem, the AT introduction starred not one but two Microsoft systems. The supermicro comes with PC DOS 3.0, an AT version of DOS 2.1; besides supporting the new hard and floppy drives and up to one megabyte of memory (anything more is good only as RAM disk space, a limitation that next spring's DOS 3.1 may change), 3.0 adds several new features.

Most are small improvements—Attrib lets you change and display files' read/write status, Label is handier than the old Format/V command for setting a disk volume name, and the Backup and Restore utilities work from hard to floppy, floppy to hard, hard to hard or floppy to floppy disks. The DOS can also adjust to six international keyboard layouts and supplies utilities for network file sharing.

The other Microsoft product, PC Xenix, is an 80286 implementation of the software giant's version of Unix System III (licensed from AT&T, which is now pushing its newer System V as a multi-user standard). PC Xenix includes the University of California's Berkeley extensions to System III as well as several AT-specific features; it supports the full three megabytes of memory for multi-user, multitasking operations, supporting up to three terminals—the AT and two other PCs or workstations.

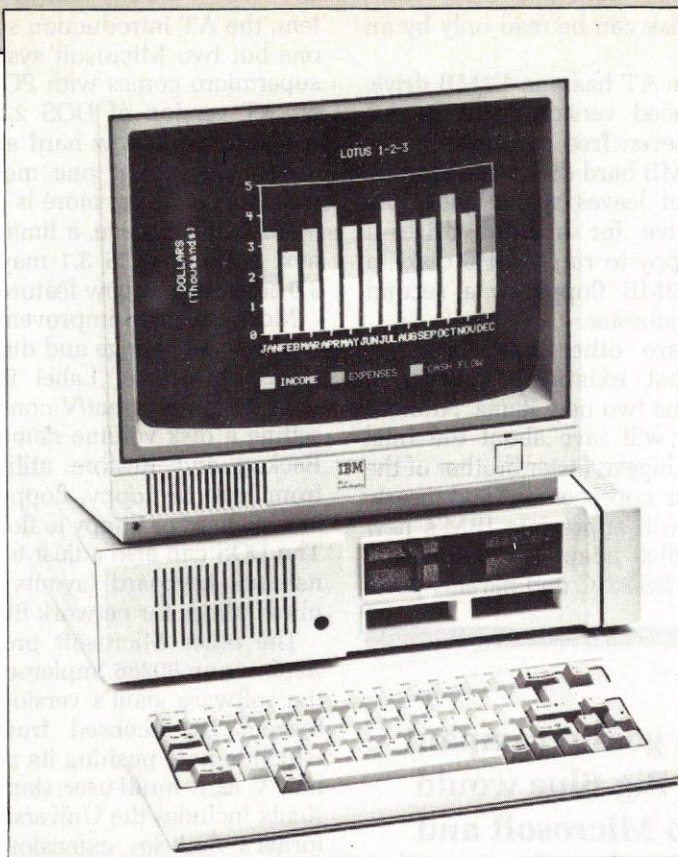
PC Xenix comes on eight 1.2MB disks. IBM will continue to sell PC/IX, the single-user Unix (on 19 standard floppies) for the older XT and its ten-megabyte hard disk.

### **Wire and Windows**

As if the AT, DOS 3.0 and PC Xenix weren't enough, IBM made two other introductions at the press reception. One, due in October, is the PC Network—not Big Blue's full-fledged, token-ring LAN (local area network), long rumored and still one or two years away, but a more modest system of ATs, PCs, or XTs connected by coaxial cable.

This broadband network is built around a stand-alone translator unit, which supports up to eight IBMs within a 200-foot radius; with extra hardware, the group can expand to 72 stations (with a custom non-IBM cable arrangement, up to 255 stations) within a 1000-foot radius. Each on-line computer needs a network adapter, a card with networking software in ROM that plugs into any expansion slot.





The new IBM PCjr features a typewriter-style keyboard, 256KB of memory, a built-in disk drive and a price tag of \$1324.

## Junior Grows Up

Two weeks before the PC AT announcement, IBM made a more predictable but nevertheless welcome move: it changed PCjr from a backward child to a promising adolescent. In the process, IBM more or less traded Junior's image as a home computer (one that never fit the 8088-based micro well anyway) for a new position as a serious, if limited, business machine—one that virtually replaces the original PC and costs \$670 less.

The most obvious change is PCjr's new keyboard, the same cordless infrared technology with real typewriter-style keys instead of the infamous chiclets. Not only did the new keyboard win applause for itself, but IBM announced it would be available at no charge to current PCjr owners (except for unfortunates who bought from discount houses rather than IBM Product Centers).

Asked why IBM was staging a keyboard giveaway rather than a swap, Entry Systems President Philip Estridge came as close to self-deprecating humor as Big Blue ever does, saying, "We didn't want the old ones back."

Except for the keyboard, the \$999 basic PCjr is unchanged (128KB RAM, one 360KB disk drive, two cartridge slots). An Apple IIc-rivaling \$1324, however, will buy a 256KB model, able to use part of its memory as a RAM disk drive and to run the memory-hogging business programs Junior couldn't touch before. A disk version of Lotus Development Corp.'s 1-2-3 was announced immediately, and the Cambridge, MA, software firm promises a cartridge version that will run on 128KB machines. "1-2-3 for \$999" should be a powerful marketing slogan.

An extra \$150 brings a power ex-

pansion attachment (with its own ac cord), which supports one or two additional 128KB memory boosters (\$325 each). In other words, you'll have only one disk drive and need another attachment to connect a parallel printer, but Junior can expand to 512KB now.

In addition, IBM announced a \$300 speech attachment (with 196 prerecorded words and sounds, plus the ability to store microphone input on disk) and a \$99 graphics program called Color-Paint, which uses a cartridge slot and a mouse to mimic Apple's monochrome MacPaint in 16 colors.

While emphasizing the improved model's business capacity over its home use, IBM plans to send Junior to school. "Writing to Read," a language lab system endorsed by Princeton, NJ's Educational Testing Service, uses a PCjr and speech attachment to teach children 42 sounds or phonemes, accompanied by on-screen pictures and instructions; pupils use workbooks and typewriters to practice writing words, sentences and stories.

By catching kids in kindergarten and first grade with "Writing to Read," IBM may preempt Apple, Tandy and Commodore's success in selling micros to schools for older students. More important than any use PCjr may find in classrooms, though, is its new status as a full-powered PC—less expandable than the senior model (\$1995 with 256KB and one drive), but considerably cheaper and with better graphics to boot. With the PCjr on one side and the awesome new AT on the other, the PC, XT and bulky Portable PC look decidedly lackluster. If Junior grew a second disk drive and a portable model, we could dismiss the original PC without a backward glance.

Considering the PC's historical importance, that's slightly sad, but that's progress. And, after a few years' inertia, IBM has become as progressive as anyone in the industry.

E.G.



Finally, the first quarter of 1985 will see TopView, a \$149 program that fits between the ease of IBM's Assistant Series (also known as Software Publishing Corp.'s pfs) programs and the sophistication of software integrators like DesQ.

TopView is a multitasking environment, built around Mac-style pop-up menus and movable, sizable windows; it supports the Microsoft, Visi-On and Mouse Systems mice as well as keyboard control and cut-and-paste transfer between applications. IBM claims it works with most DOS-based applications and gave a short list of suitable programs (most IBM-brand software plus Multiplan and VisiCalc); those that write to the PC's video buffer or check the keyboard too frequently may not take to TopView's background mode, though a spokesman said they'll run as full-screen foreground tasks.

### Panic in the Streets

Somehow, hailing the PC's successor or calling the AT a counterattack to the competition isn't strong enough. While its closest rival babbles about being "insanely great," IBM has unleashed something monstrously powerful.

IBM is the bulldozer, the unlimited hydroplane, the Mount St. Helens of personal computing; the AT is simply the most formidable machine America's desks have ever known. If you're willing to spend \$12,000 (less monitor), you can have a computer with three megabytes of RAM and 41.2MB of mass storage; that's so powerful it's ludicrous for a single-user system, but add \$395 for Xenix and you're ready to host two terminals.

Except for the lack of graphics ability and a built-in tape backup for its hard disk, the AT deals a smashing blow to the Compaq Deskpro; with its ability to move to Xenix, it not only upstages the AT&T PC but heads off the AT&T/Convergent Technologies machine expected this fall, the one supposedly placed between the 6300 and 3B2 series and able to run both MS DOS and Unix.

The one cloud on IBM's horizon is the one no one could pursue at a hands-off press briefing: software compatibility. The AT has a new ROM BIOS and floppy drive and requires a new operating system; spokesman Ted Davis told me that one noted benchmark, Flight Simulator, won't work (the 286's divide-by-

zero interrupt is different), but said, "There's a very high degree of compatibility. There are a few subtle differences [for games and graphics], but nearly all business and productivity software should run."

Reserve judgment until Microcomputing reviews an AT firsthand, but, if Davis is right and if you want to use complex software with long data files, check your bankbook and your IBM dealer.

People compare IBM and AT&T as newly matched titans in the computer business, but it makes more sense to compare IBM's computers to AT&T's phone service. For some time, IBM set a nearly monopolistic standard at nearly unchallenged prices; lately, faced with opposition, it's introduced new and competitively priced products—still an overwhelming favorite, but using its immense resources as well as its momentum. Since June, it's made life miserable for anyone who tries to sell a 128KB instead of 256KB compatible; now, it may do the same for anyone who doesn't have a 20MB hard disk. ■

## IBM's New Products

### Available August 1984:

IBM Personal Computer AT	
(256KB RAM, 1.2MB floppy drive)	\$3995
IBM Enhanced Personal Computer AT	
(512KB RAM, 1.2MB floppy drive, 20MB hard drive, serial/parallel adapter)	\$5795
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20MB hard drive	\$1595
Intel 80287 math coprocessor	\$375
Serial/parallel adapter	\$150
Serial adapter cable	\$65
Serial adapter connector	\$35
PC DOS 3.0	\$65

### Available October 1984:

PC network adapter	\$695
PC network translator unit	\$595
Various cables, expanders, distance kits	\$29-99

### Available First Quarter 1985:

PC Xenix operating system	\$395
PC Xenix software development system	\$455
PC Xenix text formatting system	\$145
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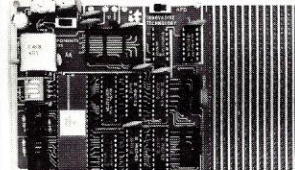
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The APB is an excellent educational aid which allows for evaluation and familiarization of 6801 family members. It is great for prototype development. Since the nuts and bolts are already in place, the designer need only add the necessary interface circuits for a particular application. It can also be used as a simple cost-effective dedicated controller for those limited quantity applications.

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# Dumping Your Kaypro's Screen

By Louis Baker

**W**ouldn't you like to be able to dump your Kaypro screen to the line printer any time you wanted? Owners of IBM PCs and other personal computers have this feature available, but so far it's been denied to Kaypro owners.

Here's a simple program to enable you to do just that. You'll be able to get a hard copy of the printer or port configurations on Perfect Writer using the PFConfig program, for example.

## Installation

You install the program by typing the command SDump after cold booting or by using CP/M's autoloader feature. You can employ the autoloader feature by using the Copy utility supplied with the Kaypro and specifying SDUMP.COM as the program to be automatically executed.

The file SDUMP.COM only occupies 1KB of disk space and, therefore, it will probably be no trouble to place on your disk. It automatically installs itself on any Kaypro, regardless of the operating system, so it works with Pluperfect's or Maplesoft's modification to CP/M.

## The Recipe

The code is designed to be implemented with the ASM.COM and

---

**Here's a simple  
program that will let  
you dump your Kaypro  
screen to a printer  
any time you want.**

---

LOAD.COM files on your system disk. Create an SDUMP.ASM file (using your favorite editor) of the program listing (Listing 1). You don't need to supply a value for the constant Condu. The code obtains the location of the BIOS CONIN function from the BIOS jump table. Therefore, it should jump to the correct location no matter what version of the operating system you have.

Put the disk with SDUMP.ASM in drive A and the system disk in drive B (unless you have a Kaypro 10, in which case your system files should be on the hard disk), and type:

```
b:asm sdump.bbb  
b:load sdump
```

As a result, on disk A you'll have a file, SDUMP.COM, among others. Copy this file to whatever disks you want, using PIP. Type SDUMP (or

use autoloader to have it automatically invoked upon cold booting) whenever you cold boot.

## The Real Story

To keep the COM file small, the program is read into memory at address 100H and relocates itself just below the operating system. It does this with the powerful Z80 LDIR instruction, which performs a loop to move the code. This instruction doesn't exist for the 8080 processor for which the ASM assembler is designed. Therefore, you fool the assembler by telling it to install the appropriate hexadecimal codes for the instruction with the DW assembler instruction.

Once installed, the code intercepts calls of the BIOS CONIN routine. If the character read in is a Control-] (decimal 29), the installed code is executed to print the characters stored in the video display area of bank one of memory. A friend suggested this was the least useful character (it's a "group separator" in ASCII).

You can easily modify the program to use another character to initiate a screen dump; simply change the CPI 29 instruction just after label DUMP1: to CPI x, where x is the decimal equivalent of the desired character. I've also written versions of



Listing 1. Kaypro screen dump to printer.

```

;- kaypro screen dump to printer (PRINT SCREEN)
; copyright 1984 Louis Baker all rights reserved
; invoke with control-J
; INTENDED FOR ASSEMBLY WITH ASM.COM 8080 CODES BUT USES Z80
; INSTR. SET
; LOCATES JUST BELOW CCP- MODIFY MOVDEST BELOW TO CHANGE THIS

BDOS EQU 0005H
bios equ 0fa00h
list equ bios+000fh
conin equ bios+0009h
condu equ 0fa74h
; FA74 PLUPERFECT FAF9 OLD CPM FB09 NEW CPM
wboot EQU BIOS+0003H
CCP EQU 0E400H ; BOTTOM OF CCP
;
lf equ 10
cr equ 13
;
ORG 100H

INSTAL:
; INSTALL PATCHES
; automatically install address into conio-
LXI H,0FA0AH ; SOURCE ADDRESS
LXI D, CONIO; DESTINATION
LXI B,0002H
DW 0B0EDH ; LDIR TWO BYTES (ADDRESS)
;
LXI B,3 ;KOUNT
LXI D,CONIN
LXI H,STUFF
DW 0B0EDH ;LDIR ;INSTALL 3 BYTES
;
; move code to higher memory-
LXI H,PATCHC ; FROM
LXI D,MOVDEST
LXI B,MOVSIZ
LOOP: DW 0B0EDH ;LDIR
; LDIR DOES IT ALL
FINII: LXI D,IDSTRG
MVI B,0
MVI C,9
CALL BDOS
;
CALL wboot
; WARM BOOT- SYSTEM PATCHED-----
STUFF: JMP DUMP1+OFFSET
IDSTRG: DB / SCREEN DUMP INSTALLER- KAYPRO II L. BAKER$%
; ORG 4000H OR HIGHER
PATCHC: jentry from BIOS CONIN patch-
DUMP1: CALL CONDU ; input char. from console
CONIO EQU DUMP1 + 1
; The address portion of call condu starts at dump1+1 with offset
CPI 29 ; (DECIMAL)is it Cntrl-J?
RNZ
;
sdump:
; PUSH AF
PUSH B
; PUSH H
;
LD (SVSP+OFFSET),SP ; SAVE STACK POINTER
DW 073EDH
DW SVSP+OFFSET ;ADDRESS PORTION
; LD (SVAF+OFFSET),A ; SAVE A (AND NOT F)
; DE NOW IN HL
XCHG SHLD svde+offset ; HL SAVED DIRECTLY-IE.,DE SAVED IN SVDE
; environment preserved....
XRA A ; BE SURE ITS LOCATED AT 4000H DUE TO END STMT.
STA linc+OFFSET; CLEAR
loopz: MVI c,cr
call list
MVI c,lf
call list
XRA A ;CLEAR
STA colc+OFFSET;ZERO COLUMN NUMBER
loopx: CALL BANKS+OFFSET ; look at mmio stuff.
LDA linc+OFFSET
MOV B,A ;b=col. number
LDA colc+OFFSET
MOV H,A ; h=line number
call mmc+OFFSET ; find chr- de points to chr
; hl points to chr
XCHG MOV e,M ;get chr into e
call banks+OFFSET
MOV c,e
call list ; output chr
LDA colc+OFFSET
SUI 079
JM bumpc+OFFSET
lda linc+OFFSET
SUI 024
JM bump1+OFFSET
; we are done

```

this code that dump when you use the appropriate keypad character. This is a bit complex; send me a letter with a stamped, self-addressed envelope and I'll send you the details.

The subroutines Banks and MMC switch the memory banks and return the address of a screen location in the video display area of RAM, respectively. They may be useful for various functions. For example, I've written codes to scroll and pan the screen display, using them.

Some codes build tables downward from the operating system, thereby overwriting the screen dump utility. If this is your problem, change the statement MOVDEST EQU CCP-MOVSIZ-02 near the listing end to something that places the program below the table area, e.g., something like MOVDEST EQU 0B00H or MOVDEST EQU CCP-MOVSIZ-0400H. I haven't encountered such problems yet.

If you'd prefer not to have to type this code in, I'll send it to you on a disk with instructions for a measly \$10.■

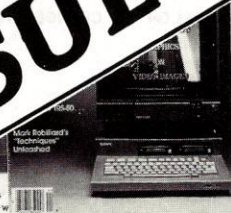


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Listing continued.

```

; LD SP,(SVSP+OFFSET)
; DW 07BEDH
; DW SVSP+OFFSET
; LDA SVAF+OFFSET
; LHL SVDE+OFFSET ; LOAD HL DIRECT
; XCHG ; PUT INTO DE
; pop h
; pop b
; JMP conin ; if we jump to conin, it will not send
; the , but ask for another input chr, then return normally!
bumpc: LDA (colc+OFFSET)
; INR a
; STA (colc+OFFSET)
; JMP loopx+OFFSET
bump1: LDA (linc+OFFSET)
; INR a
; STA (linc+OFFSET)
; JMP loopz+OFFSET

; linc: ds 1
; colc: ds 1
;
; SVSP: DS 2
; SVAF: DS 2
; SVDE: DS 2
;
;
; .8080
; HOB EQU 80H
BANKS:
; IN 1CH ; CHANNEL OF SYSTEM PORT
; XRI 80H ; CHANGE HIGH ORDER BIT
; OUT 1CH ; REVISED SYSTEM PORT
; RET ;RETURN

; MM- SUBROUTINE TO ACCESS A MEMORY-MAPPED I/O LOC
; INPUT PARAMETERS:
; B = LINE (0-23)
; H = COLUMN (0-79)
; RESULT: DE POINTS TO LOC ( HL POINTS IF XCHG ACTIVATED)
MMC:
; mov a,b ; acc=line number
; sui 24
; jm lok1+OFFSET
; mvi a,23 ; was too big-limit to 23
; jmp lok2+OFFSET
lok1: mov a,b
lok2: MOV B,A ; REPLACE LINE NUMBER AS LIMITED
; mov A,H
; sui 80
; jm colok+OFFSET
; mvi a,79
; jmp colok2+OFFSET ; was too big- limit to 79
colok: mov a,h
colok2: mov h,a
; lower case stuff is added coding to limit b,h to memory map
; FIRST HANDLE LINE OFFSET
; STC
; CMC ; CLEAR CARRY BIT( SO WE DON'T PUT EXTRANEOUS 1 AT TOP)
; MOV A,B ; GET LIN NUMBER
; RAR ; GET LOWEST BIT INTO CARRY DO NOT CIRCULAR SHIFT IT
; MOV D,A ; PUT AWAY H.O. BYTE

;
;
; JC LW+OFFSET

;
; DITTO L.O. BYTE
;
; MVI E,80H
; JMP COL+OFFSET
LW: MVI E,80H
COL: MVI A,80H ; ADD OFFSET OF MM I/O
; ADD D
; MOV D,A
; NOW HANDLE COLUMN OFFSET
; MOV A,H
; SBI 64
; JM OK+OFFSET
; MVI A,48
; ADD H
; JMP FINI+OFFSET
OK: MOV A,H ; DON'T HAVE TO ADD IF COL<64
FINI: ADD E ; ADD TO DE
; MOV E,A
; XRA A ; CLEAR A
; ADC D
; MOV D,A ; HOB IN E 128 IF PRESENT- THIS SHOULD NOT BE NEEDED

; XCHG ; HL NOW POINTS deactivated at present-de points
; RET
final: ds 0
MOVSI2 EQU final-patchc
MOVDEST EQU CCP-MOVSI2-02
OFFSET EQU MOVDEST-PATCHC
;
; END INSTAL

```



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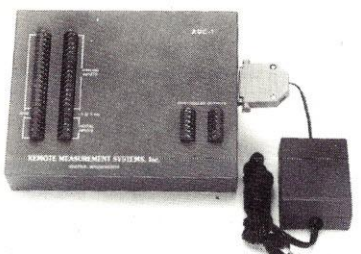
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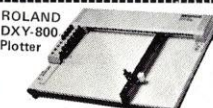
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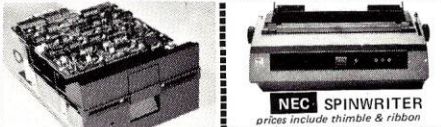
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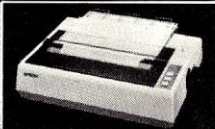
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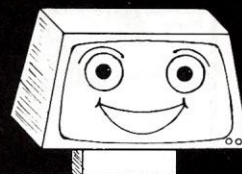


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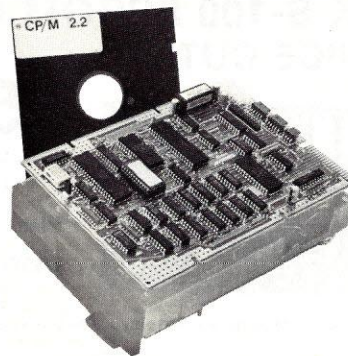
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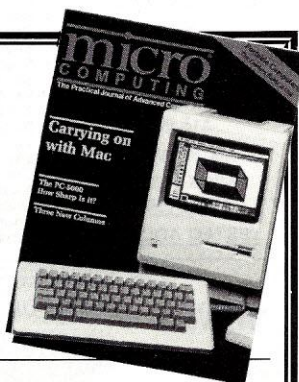
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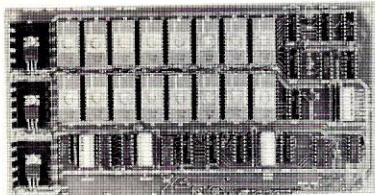
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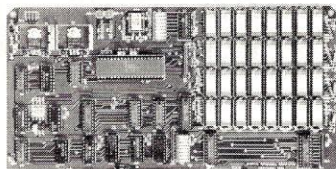
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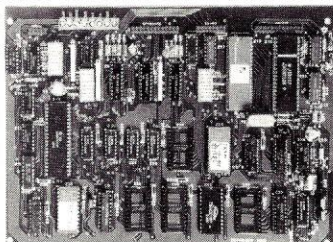
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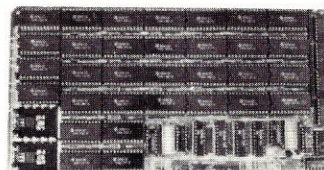
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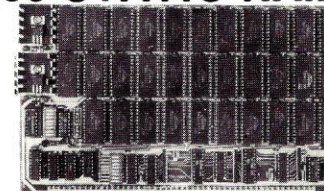
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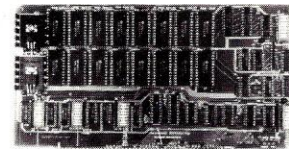
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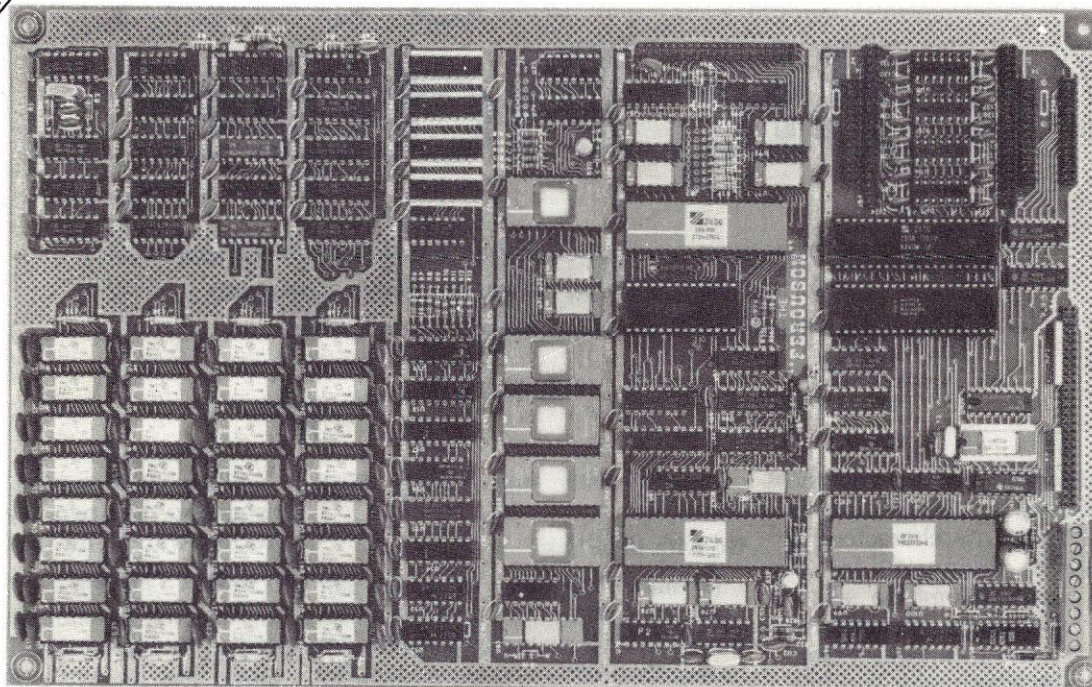


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# Getting the Big Picture

*If you program on your IBM and would like to see more information displayed on-screen, here's a program that should virtually eliminate your problems.*

By Hiro Sawada

**T**he standard monitor for the IBM Personal Computer allows a screen of 80 by 25 characters; a television screen allows 40 by 25 characters. Any attempt to show more than this requires an expensive monitor or the use of a virtual page with the screen acting as a window onto the page.

Commercial programs, such as VisiCalc, and many word processors use the latter approach to display a large amount of information on the screen. But what about you, the Basic programmer or the inexperienced 8086 machine code programmer who wants to display more than this amount of information on a screen?

The IBM PC Technical Reference Manual has the information you need to scroll the screen vertically but provides no means for scrolling horizontally.

## Packing It In

This program provides a virtual page screen that's 160 columns by 25 rows on a monitor (80 columns by 25 rows on a regular television). It takes advantage of the fact that most people with IBM PCs have the color board with at least 16KB of memory but use only 2KB or 4KB at a time, with the rest remaining idle.

This program uses the unused section of the video memory as the virtual page in the alphanumeric mode, with both the character and the attribute scrolled horizontally for flexibility.

It is designed to be accessed from Basic and may be either poked into memory and saved as machine code,

or used with any handy 8086 assembler.

## Go with the Flow

To move the page right, the left window column is saved on the stack, then the rows and columns are rewritten to the left one column; the column to be written from screen 1 is calculated and placed on the right window column. It's a similar process for moving the page left. Any other guidance is available from the Basic-like comments on the listing

## The Virtual Screen

After the program is either poked or assembled, BSave it as "VIRT.M". Then, in a 64KB system, type

```
CLEAR ,&h8000    'RESERVE THE UPPER
                  4KB OF MEMORY

DEF SEG = &hF00
BLOAD "VIRT.M",0
DEFINT A,B        'OR USE THE "%" TO
                  DEFINE INTEGERS
                  'A=0 BY DEFAULT
                  'B=0 TO MOVE PAGE
                  RIGHT
                  'B=1 TO MOVE PAGE
                  LEFT
                  'B=2 TO READ THE
                  VIRTUAL PAGE
                  CURSOR

CALL A(B)
```

When VIRT is called with B=0 or 1, B after the call will contain zero when horizontal scrolling takes place and minus one when it is already on virtual page column 1 or 160 and you attempt to scroll past the virtual page edge. When B=2, the value returned is between  $1*256+1$  and  $25*256+160$  and represents the row value times 256 added to the column value.

When the requested number for B is greater than two, the number is returned without any task performed.

## Finding a Home

The program can be relocated into any part of the memory since the program uses its own internal stack and data segment area. (DEF SEG = &HF01 or higher will work just as well in a system with more than 64KB.) Of course, if you have a RAM disk, reserve the extra 4KB for VIRT if you don't want to let it reside within the base 64KB. When using this program with a TV, you should equate RIGHT to 39, not 79.

## Troubleshooting List

- Doesn't work: If you are poking or using the IBM's assembler, recheck your typing. If you are using another assembler, it may be generating different codes, e.g., the IBM's assembler interprets JCXZ ADDRESS as JUMP TO ADDRESS IF CX IS ZERO. One that I used interpreted it as JUMP TO ADDRESS IF CX IS NOT ZERO.

- System bombs out: The upper 4KB of memory was not reserved, DEF SEG was changed, or A is not zero.

- Only scroll right works: The B value was not set to an integer.

- Screen has snow: You loaded the program into the screen memory; reload elsewhere.

- Bombs out now and then: Possibly this is caused by a cheap memory chip failure—pity.■

Address correspondence to Hiro Sawada, 8455 Wiseman Ave., Montreal, Quebec, Canada H3N 2P5.



Listing 1. VIRT provides virtual page horizontal scrolling to expand monitor display. The program was written with a macro language, which accounts for the Basic-like comments, and assembled using the IBM PC assembler.

```

;TBEGIN
0000 CSEG SEGMENT PARA PUBLIC 'CODE'
      ASSUME CS:CSEG,DS:CSEG,ES:CSEG
;
0000 EB 29 90 START: JMP BEGIN
0003 00 BLEFT DB 0 ;VIRTUAL SCREEN LEFT
;
;BH IS THE ACTIVE SCREEN NUMBERS 0,1
;DH IS THE CURSOR ROW LOCATION
;DL IS THE CURSOR COLUMN LOCATION
;CH/CL ARE USED FOR THE VIRTUAL ROW/COL
;
LEFT EQU 0 ;LEFT OF WINDOW
RIGHT EQU 79 ;RIGHT OF WINDOW
TOP EQU 0 ;TOP OF WINDOW
BOTTOM EQU 24 ;BOTTOM OF WINDOW
WINDOW EQU 0 ;WINDOW SCREEN NUMBER
NEXT EQU INC
LAST EQU DEC
;
;PLACES CURSOR AT ROW/COL=DH/DL
;TO CURSLOC() PUSH AX,,MOV AH,2
0004 CURSLOC:
0004 CD 10 INT 10H
0006 58 POP AX
0007 C3 RET
;
;READS VIRTUAL CURSOR LOCATION
;TO CURSRED()
0008 CURSRED:
0008 B4 03 MOV AH,3
000A B7 00 MOV BH,WINDOW
000C CD 10 INT 10H
000E FE C2 INC DL ;BASIC CURSOR LOC ADJUSTER
0010 FE C6 INC DH
0012 02 16 0003 R ADD DL,BLEFT
0016 8B C2 MOV AX,DX
0018 C3 RET
;
;READS THE CHAR/ATTRI AT DH/DL
;TO READ() CALL CURSLOC
0019 READ:
0019 B4 08 MOV AH,8
001B CD 10 INT 10H
001D C3 RET
;TO WRITE() CALL CURSLOC,,PUSH CX
001E WRITE:
001E 53 PUSH BX
001F 8A DC MOV BL,AH
0021 B4 09 MOV AH,9
0023 B9 0001 MOV CX,1
0026 CD 10 INT 10H
0028 5B POP BX
;
0029 59 POP CX
002A C3 RET
;
;TO BEGIN(SP=OFFFH;SS=BX+BX/CS;SI=SS;AX
=[SI];SI=[BP+6];BP=SP/BP)
002B BEGIN:
002B 55 push BP
002C 8B EC mov BP,SP
002E 8B 76 06 mov SI,[BP+6]
0031 8B 04 mov AX,[SI]
0033 8C D6 mov SI,SS
0035 0E push CS
0036 5B pop BX
0037 8E D3 mov SS,BX
0039 BC OFFF mov SP,OFFFH
003C 56 PUSH SI ;SS SAVED
003D 55 PUSH BP ;SP SAVED
003E 1E PUSH DS
003F 0E PUSH CS
0040 1F POP DS
;
;ON AL GOSUB MOVWRITE,MOVLEFT,CURSRED
jmp short _S0
_T3 label word
dw offset MOVWRITE
dw offset MOVLEFT
dw offset CURSRED
_S0:
os=$-_T3
push si
push ax
xor ah,ah
sal ax,1
mov si,ax
pop ax
cmp si,os
jae _S1
call word ptr cs:[si+offset _T3
]

```

Listing continued.

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## Listing continued.

```

005C      _S1:
005C      5E          pop si
005D      E9 0178 R    JMP FINISH
;
;TO MOVWRITE()
MOVWRITE:
;TIF 0,ON.RIGHT.SIDE,BLEFT ) RIGHT
;          cmp BLEFT,RIGHT
;          jle _IO
0060      80 3E 0003 R 4F    MOV AX,-1
0065      7E 04          RET
0067      B8 FFFF
006A      C3          ;TENDIF 0
;
_IO:
;SAVE AX,BX,CX,DX
006B      50          push AX
006C      53          push BX
006D      51          push CX
006E      52          push DX
006F      B2 00        MOV DL,LEFT
0071      B7 00        MOV BH,WINDOW
;REPEAT 0,ON.LEFT.COL,FOR DH = TOP TO B
OTTOM
;          mov DH,TOP
;          jmp short _S8
_R0:
;          inc DH
_S8:
;          cmp DH,BOTTOM
;          jg _R1
;SAVE READ(AX)
;          call READ
;          push AX
;ENDREP 0
;          jmp _R0
_R1:
;MOVE WINDOW LEFT
;SAVE AX,CX,SI,DI,DS,ES
0084      50          push AX
0085      51          push CX
0086      56          push SI
0087      57          push DI
0088      1E          push DS
0089      06          push ES
;TO SET-SEGMENTS (ES=AX;DS=AX-0B800H)
008A      B8 B800      mov AX,0B800H
008D      8E D8        mov DS,AX
008F      8E C0        mov ES,AX
;TO SET-SOURCE&DESTINATION (!REP@MOVSW;
CX=1999;DI=0;SI=2!CLD)
0091      FC          CLD
0092      BE 0002      mov SI,2
0095      BF 0000      mov DI,0
0098      B9 07CF      mov CX,1999
009B      F3/ A5      REP MOVSW
;UNSAVE AX,CX,SI,DI,DS,ES
009D      07          pop ES
009E      1F          pop DS
009F      5F          pop DI
00A0      5E          pop SI
00A1      59          pop CX
00A2      58          pop AX
;WRITE VIRTUAL PAGE TO WINDOW ON RIGHT COL.
; CALCULATE #ROWS TO WRITE FROM SCREEN 1 TO WI
NDOW
00A3      B5 00        MOV CH,TOP

```

```

00A5      8A 0E 0003 R    MOV CL,BLEFT
00A9      B2 4F          MOV DL,RIGHT
;REPEAT 0,ON.WINDOW.ROW,FOR DH = TOP TO
BOTTOM
00AB      B6 00          mov DH,TOP
;
;          jmp short _SA
00AD      EB 02          _R2:
00AF      5A          inc DH
00AF      FE C6          _SA:
00B1      80 FE 18      cmp DH,BOTTOM
00B4      7F 12          jg _R3
00B6      52          PUSH DX
00B7      FE C7          NEXT BH
;GOSUB READ SCR.1.COL=BLEFT.ROW=TOP+ (D
X=CX)
;          mov DX,CX
;          call READ
;          POP DX
;          LAST BH ;ON THE WINDOW,
;          CALL WRITE ;WRITE AT COL = 79
;          NEXT CH ;NEXT ROW TO READ
;          ENDREP 0
;          jmp _R2
_R3:
;WRITE STORED LINE TO VIRTUAL PAGE
;CALCULATE #ROWS TO WRITE TO SCREEN 1
00C8      B7 01        MOV BH,1
00CA      8A 16 0003 R    MOV DL,BLEFT
;REPEAT 0,ROW=24TOO,FOR DH = BOTTOM TO TO
TOP DEC
00CE      B6 18          mov DH,BOTTOM
00D0      EB 02          jmp short _SC
00D2      FE CE          _R4:
00D4      80 FE 00      dec DH
00D7      7C 06          _SC:
00D9      58          cmp DH,TOP
00DA      E8 001E R      jl _R5
;          POP AX
;          CALL WRITE
;          ENDREP 0
;          jmp _R4
_R5:
NEXT BLEFT
SUB AX,AX
;UNSAVE AX,BX,CX,DX
00E5      5A          pop DX
00E6      59          pop CX
00E7      5B          pop BX
00E8      58          pop AX
;          RET
;
;TO MOVLEFT()
MOVLEFT:
;TIF 0,ON.LEFT.SIDE,BLEFT = LEFT
00EA      80 3E 0003 R 00    cmp BLEFT,LEFT
00EF      75 04          jne _I2
00F1      B8 FFFF      MOV AX,-1
00F4      C3          RET
;TENDIF 0
_I2:

```

Listing continued.



Listing continued.

```

;SAVE AX,BX,CX,DX
00F5 50      push AX
00F6 53      push BX
00F7 51      push CX
00F8 52      push DX
00F9 B2 4F   MOV DL,RIGHT
00FB B7 00   MOV BH,WINDOW
;REPEAT 0,ON.RIGHT.COL,FOR DH = TOP TO
BOTTOM
00FD B6 00   mov DH,TOP
00FF EB 02   jmp short _S12
_R6:         inc DH
_S12:        cmp DH,BOTTOM
0103 80 FE 18 jg _R7
0106 7F 06   ;SAVE READ(AX)
0108 E8 0019 R call READ
010B 50      push AX
;ENDREP 0
010C EB F3   jmp _R6
_R7:         ;MOVE WINDOW RIGHT
;SAVE AX,CX,SI,DI,DS,ES
010E 50      push AX
010F 51      push CX
0110 56      push SI
0111 57      push DI
0112 1E      push DS
0113 06      push ES
;TO SET-SEGMENTS (ES=AX;DS=AX=0B800H)
0114 B8 B800 mov AX,0B800H
0117 8E D8   mov DS,AX
0119 8E C0   mov ES,AX
;TO SET-SOURCE&DESTINATION (!REP@MOVSW;
CX=1999;DI=3996;SI=3998!STD)
011B FD     STD
011C BE 0F9E mov SI,3998
011F BF 0F9C mov DI,3996
0122 B9 07CF mov CX,1999
0125 F3/ A5 REP MOVSW
;UNSAVE AX,CX,SI,DI,DS,ES
0127 07     pop ES
0128 1F     pop DS
0129 5F     pop DI
012A 5E     pop SI
012B 59     pop CX
012C 58     pop AX
;WRITE VIRTUAL PAGE TO WINDOW ON LEFT COL
;CALCUL #ROWS TO WRITE FROM SCREEN 1 TO WINDOW
012D B5 00   MOV CH,TOP
012F 8A 0E 0003 R MOV CL,BLEFT
0133 FE C9   DEC CL
0135 B2 00   MOV DL,LEFT
;REPEAT 0,ON.WIND.ROW FOR DH = TOP TO B
OTTOM
0137 B6 00   mov DH,TOP
0139 EB 02   jmp short _S14

```

```

013B FE C6   _R8:         inc DH
013D         _S14:        cmp DH,BOTTOM
013D 80 FE 18 jg _R9
0140 7F 12   PUSH DX
0142 52      NEXT BH
0143 FE C7   ;GOSUB READ SCR.1.COL=BLEFT-1.ROW=TOP+
(DX=CX)
0145 8B D1   mov DX,CX
0147 E8 0019 R call READ
014A 5A      POP DX
014B FE CF   LAST BH ;ON WINDOW.
014D E8 001E R CALL WRITE ;WRITE AT COL = 0
0150 FE C5   NEXT CH ;NEXT VIRTUAL ROW TO READ
;ENDREP 0
0152 EB E7   jmp _R8
0154         _R9:        ;WRITE STORED LINE TO VIRTUAL PAGE
;CALCULATE #ROWS TO WRITE TO SCREEN 1
0154 B7 01   MOV BH,1
0156 8A 16 0003 R MOV DL,BLEFT
015A FE CA   DEC DL
;REPEAT 0,ON.WIND.ROW,FOR DH = BOTTOM T
O TOP DEC
015C B6 18   mov DH,BOTTOM
015E EB 02   jmp short _S16
_R6:         dec DH
_S16:        cmp DH,TOP
0160 FE CE   jl _RB
0162 80 FE 00
0165 7C 06   POP AX
0167 58      CALL WRITE
0168 E8 001E R ;ENDREP 0
016B EB F3   jmp _RA
016D         _RB:        LAST BLEFT
016D FE 0E 0003 R SUB AX,AX
0171 2B C0   ;UNSAVE AX,BX,CX,DX
0173 5A      pop DX
0174 59      pop CX
0175 5B      pop BX
0176 58      pop AX
0177 C3      RET
;
; FINISH: POP DS
0178 1F     POP BP ;SP UNSAVED
0179 5D     POP BX ;SS UNSAVED
017A 5B     MOV SS,BX
017B 8E D3   MOV SP,BP
017D 8B E5   MOV SI,[BP+6]
017F 8B 76 06
0182 89 04   MOV [SI],AX
0184 5D     POP BP
0185         BYE PROC FAR
0185 CA 0002 RET 2
0188         BYE ENDP
;
; CSEG ENDS
END START

```



# SOFTWARE REVIEWS

## DiskarRanger—To the Rescue?

**System Requirements:** Apple II, IIe or IIc; 48KB (64KB for certain extra functions); one disk drive.

**Manufacturer:** Penguin Software, 830 Fourth Ave., PO Box 311, Geneva, IL 60134.

**Price:** \$29.95.

Webster's defines *utility* as being something that's "useful or designed for use." The DiskarRanger is a utility-designed program to help the Apple computer programmer. The package won't overwhelm you with its capabilities, but I think you'll find it useful. The system requires at least one disk drive and 48KB of memory and will run on any of the Apple II micros.

### DiskarRanging

The DiskarRanger has a cute name and a long list of features—it even plays a brief tune when you start it that makes you think you're watching an old Lone Ranger movie. The program uses a series of one-character commands to change the order and appearance of your disk catalog.

Probably the most useful idea is to put your catalog(s) into alphabetical order, although the package can also structure them according to file type. If you prefer to rearrange your files manually, the program lets you select each catalog item and move it to where you'd like it to be. There's even a mode

that lets you pick and move files with your joystick.

When you examine the details of a disk catalog with the DiskarRanger, it shows all deleted files marked, as you'd expect, with a D. The system includes a function that will restore deleted files, but it generally works only if you use it immediately following deletion.

Once other data's been sent to the disk, the deleted file might be written over and then can't be recovered.

The DiskarRanger makes it easy to change the name of a file, and you can even use flashing, control and inverse characters in your filenames. However, this free-form way of naming things comes with a price: you must use a name that's 30 characters long.

You'd like to add a comment line or two to your catalog? The DiskarRanger lets you. How about changing the Hello program so another will load when the disk is booted? You'd like to globally lock or unlock all the files on a disk? It's all easy with this package.

The system also provides a disk map function that graphically shows you a picture of where your information is located on disk. Fig. 1 shows the size and location of the Apple CopyA program on your DOS 3.3 master disk. The sectors run up and down the left side of the picture, and the track numbers run along the bottom (both are in hexadecimal). The T is where the track/sector list is; the sectors used by the CopyA program are shown as asterisks.

### Speed

The DiskarRanger is surprisingly fast in all of its operations—your screen blinks once and the job is done. The program includes a preview that displays your revised catalog as you'll see it with the Catalog command. None of your

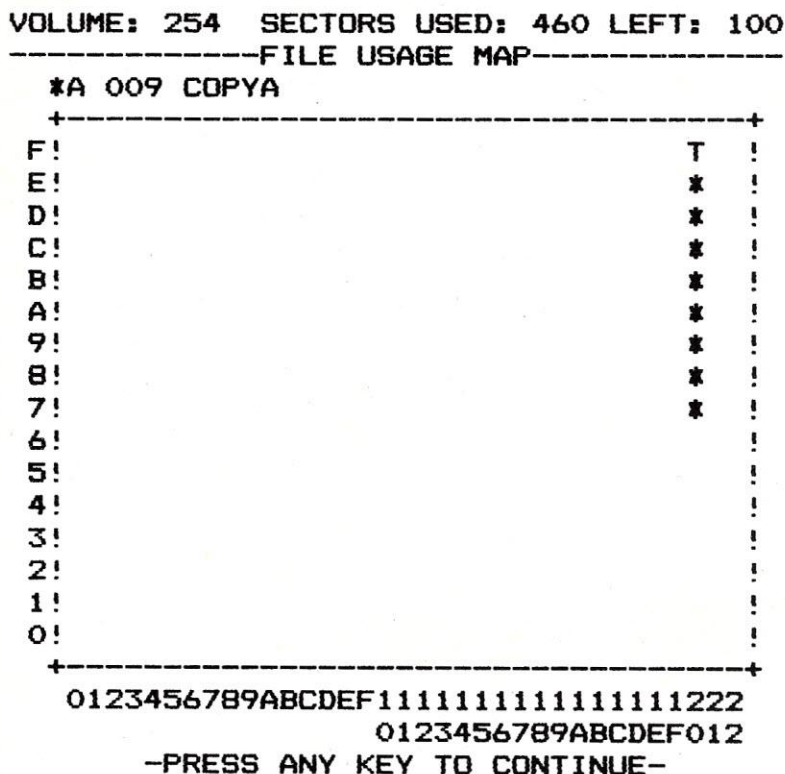


Fig. 1. DiskarRanger disk map function showing the size and location of the Apple CopyA program on a DOS master 3.3 disk.



manipulations are permanent until you write them to your disk, so you can move filenames around, change them, add comment lines as you wish and then save your new catalog only when it's just the way you'd like it to be.

If you have 64KB of memory inside your Apple, you can use more than one drive and look at the catalogs of the disks in any drive you have on-line. There's also a built-in copy program that will copy only the files you select. One limitation here: if there's not enough space on the disk to which you're copying a file, the program won't tell you. It doesn't write the new file to the disk catalog, but it seems to me it should beep and let you know there isn't enough room to store the copy.

You could just about run the

DiskarRanger without reference to the manual as there are help screens that detail each command. The manual itself is only 12 pages long and doesn't have an index, but it does give you the information you need to operate the system. The disk is copyable.

#### To Buy or Not to Buy

The DiskarRanger is designed to let you rearrange your catalog to make it easier to use; it'll even change the Hello program that starts when you boot the disk. The package can recover deleted files and provides limited on-screen help. If you've got a few extra dollars, you won't go wrong if you add the DiskarRanger to your program library.

**Greg Glau  
Prescott, AZ**

Copylink is for serious computer users. The fact that Copylink is command-driven is an advantage because it offers greater speed of operation than user-friendly menu systems do. To get things started with Copylink (once your parameters are set, of course, and your numbers and macros are set up in a phone directory), all you have to do is type in Call Source or any other preprogrammed name. Copylink's extensive help facility will step newcomers through the powerful features of this program with clear and concise help messages. PC/Intercomm offers VT100 emulation; Copylink offers the ability to do high-speed direct data transfers between any of the computers supported. For \$30 more, Copylink can be ordered in any two of the formats offered.

#### Copylink

Copylink is one of the most powerful data communications packages available at any price. The fact that it can be purchased for less than \$100 makes it the best communications value on the market today in terms of power per dollar. Copylink supports the Xmodem and Modem 7 RCPM bulletin board file transfer protocol. It also has its own proprietary fast transfer mode that speeds file transfers between two systems running Copylink—up to 50 percent faster at 1200 bits per second (bps). If you happen to be in the fortunate situation of having, for example, an IBM PC and a Kaypro, you can order this program for both machines and do direct wire (null modem) file transfers at speeds of up to 19,200 bps.

One especially nice feature of Copylink is that when the disk in the receiving computer is full, the program stops data transmission and prompts you to put in a new disk. This is particularly handy in situations where you are using two different systems, such as when your IBM disk holds 360KB and your Kaypro has almost 400KB.

Copylink supports multiple file transfers with normal wild card parameters specified (\* and ?). You can also specify multiple files to be

## Copylink vs PC/Intercomm

#### Copylink

**System Requirements:** Eight- or 16-bit machine (more than 35 formats available); 48KB; one disk drive.

**Manufacturer:** U.S. Digital Corp., 5699-D S.E. International Way, Milwaukie, OR 97222.

**Price:** \$99.

#### PC/Intercomm

**System Requirements:** IBM PC, Tandy 2000 or Zenith Z-100; 128KB; one disk drive.

**Manufacturer:** Mark of the Unicorn, 222 Third St., Cambridge, MA 02142.

**Price:** \$99.

The current computer communications revolution is now even easier to participate in with the arrival of two under-\$100 modem programs. Of course, Ward Christensen's excellent modem program is on many bulletin board systems (for free, even), but it lacks the ease of use needed by all but the most experienced user.

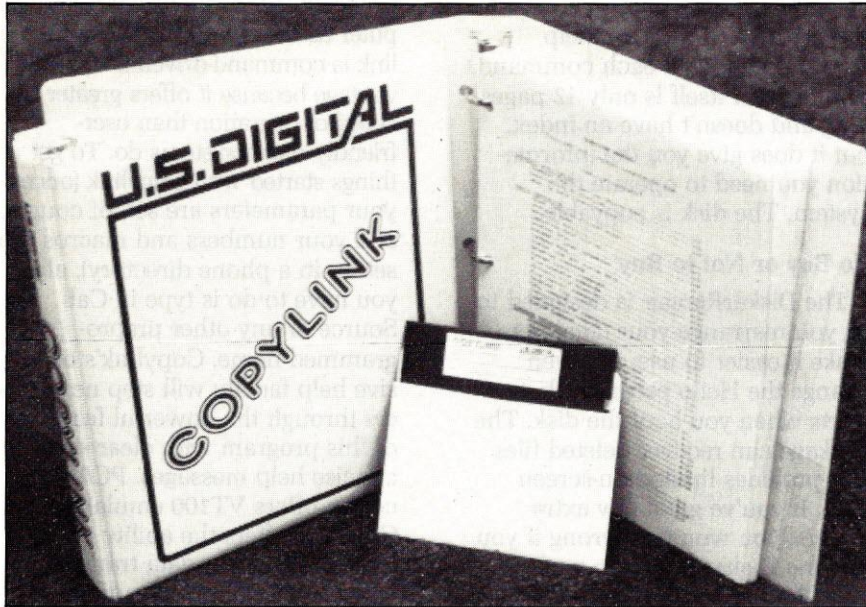
PC/Intercomm by Mark of the Unicorn and Copylink by U.S. Digital Corp. both offer full-featured communications programs that

even a novice can appreciate and use. The real breakthrough of these two programs is their price tags—\$99. Other data communications programs offering similar features and power retail for \$150–\$195.

#### Decisions, Decisions

Both programs offer a lot for the money, but they are targeted toward different users. PC/Intercomm is designed for the IBM Personal Computer and its clones, including the Tandy 2000 and the Zenith Z-100. Copylink can be ordered for more than 35 different CP/M and MS DOS machines. Because of its menu-driven format, PC/Intercomm may be best suited for a busy business executive who doesn't want to learn the considerable complexities of data communications or even any commands, but who just wants to read the options on the screen and be given a selection to choose from. If you want to interact with your company's mainframe as a DEC VT100 terminal, for example, PC/Intercomm becomes an essential tool for your PC.





sent by delimiting them with commas. You can use these two methods of sending multiple files in combination with each other as well, which makes it especially easy to send many files at one time.

#### A Commanding View

Copylink comes up in the command mode, which is identifiable by the status line followed by the command prompt. Commands in Copylink are logical descriptive words for whatever action you want. For example, if you want to change the bit rate, you simply type Baud followed by the desired value. Three of the most common commands (Terminal, Save and Receive) can be entered with their first character only. An amazing 76 commands are available in the terminal mode, including ten Send Logged String commands (ESC 0 to 9) used to create macros, and 26 Escape/Control commands (ESC ^ A to Z). A command prompt with a bit rate change command following looks like this:

```
Command:BAUD 1200 <RETURN>
```

This command line makes the appropriate change in the status line, which looks like this:

```
Default drive=A:R/W Used:375K Free: 125K
Total:400K —@—$—B:1200—
M————Command:
```

In this example, the @ sign signifies that you're on-line, the 1 sign indicates that you're receiving the carrier and the M shows that you are in Copylink's multimode (the multiple file transfer mode). The Command: below the status line shows that Copylink is ready for the next command. Other symbols appear in the status line to let you know what your current setup is.

The only major criticism that I have for this otherwise excellent program is that with 25 character symbols available for status line display, it's sometimes easy to become confused as to what they mean, requiring reference to the on-line Copylink help facility or to the manual. Once you input the desired parameters using the appropriate commands, you can save them using the Custom command. If no filename is specified after the command, the Copylink .com file is overwritten and the new parameters become the defaults. If you wish to save the original default settings, simply specify a different filename after the Custom command. For example:

```
Command:Custom cl.com
```

The Custom command creates a Copylink command file with the parameters for whatever specific

system you wish to connect with. Using the Custom command, you can also make permanent phone numbers you've added to the Copylink phone directory with the Add command. One undocumented warning about the Custom command: don't use it if you have your modem turned on. If you write your phone numbers to a file while the modem is on, the program will give you a message telling you to hang up and call again when you try to call one of those numbers.

The Copylink manual is a thick three-ring notebook that consists of photocopied pages of letter-quality printout—this makes revisions easy to do, I suppose. U.S. Digital assures me that it'll include the dialing bug warning in the next manual. In fact, the manual has undergone a recent revision that eliminated a simplistic introduction to data communications. So you won't feel you've missed anything, here's the first paragraph from that introduction:

"Data communications is a process similar to people conversing. A person can read an order form, speaking the words, into a phone, while on the other end, a person hears the words, and writes them down."

It's doubtful you'll miss the introduction; what may be missed is the source code for customizing the program, which used to be included in the appendix. That's also deleted from the new version of the manual, but you can request it.

#### PC/Intercomm

PC/Intercomm is a VT100 emulator and communications package for the IBM Personal Computer. Digital Equipment Corp.'s VT100 smart terminal is an industry standard, and VT100 emulation by the PC/Intercomm program assures compatibility not only with DEC mainframes, but with any other mainframe system or computer network using asynchronous RS-232C standard ASCII communications.

The value of being able to emulate the VT100 is that you can run full-screen video applications instead of teletype, line-at-a-time



transmission that most communications programs use. Programs that use direct cursor positioning, such as word processors, menu systems, accounting programs and data forms packages, can be run on your computer. Line and screen clearing, emboldening, underlining, line drawing and most other VT100 features are also supported.

Due to inherent limitations in the IBM's video capabilities, some of the VT100's video attribute combinations can't be displayed. Only the VT100's 80-column display is implemented. When the control sequence to switch to a 132-column display is received, it's recognized and the screen is cleared but the 80-column display remains. Double-width and double-height lines are displayed by normal width characters separated by spaces. Similar IBM hardware limitations transform VT100's smooth scroll to "slow scroll."

The keyboard conforms to the IBM conventions, which means that neither typematic (repeat) nor key click can be turned off. Some graphics characters are different, and separate transmit and receive communications speeds aren't supported. These and some other minor differences are listed in the PC/Intercomm manual's appendix.

The VT100 has a 24-line screen display as opposed to the IBM's 25 lines—the extra line can be left blank or can display status information at your option. Two status line displays are available. The main one is referred to as the "time display"; as the name implies, it shows the time of day as well as the amount of time PC/Intercomm has been running. Other helpful information, such as the status of your caps lock and number lock keys, is also provided along with communications parameters (full or half duplex), and information on whether the text is being saved to a file or sent to your printer. The other status line display is called the "LEDs display"—this refers to the VT100 keyboard's light-emitting diodes.

IBM function keys 1-4 represent the four function keys on the VT100; 5-8 act as the cursor keys.

---

**If VT100 emulation  
were all that  
PC/Intercomm  
offered, it would  
still be well worth  
the \$99 price tag,  
but menu-driven  
communications and  
a file transfer  
program are also  
included.**

---

There are some functions that PC/Intercomm's VT100 emulation supports that the DEC terminal does not. Chief among these are the ability to define 30 function keys (ALT, CTRL and Shift F1-F10). Also, the IBM alternate key, in combination with other character keys, allows you to save the

screen image (ALT-X), append text to a file (ALT-A), save the collected text to a file (ALT-S) and transmit a file (ALT-T).

To summarize, PC/Intercomm's VT100 emulation offers as complete a VT100 terminal emulation as possible considering the IBM's hardware restraints.

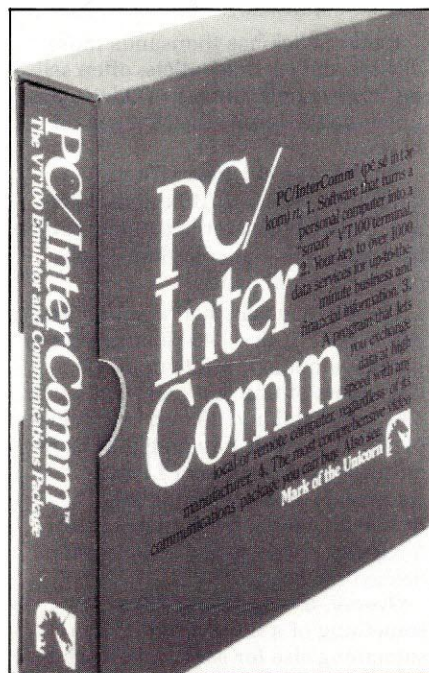
#### **It's Worth It**

If VT100 emulation were all that PC/Intercomm offered, it would be well worth the \$99 price tag, but the package also has a fully menu-driven communications and file transfer program. PC/Intercomm supports the popular Modem 7 file transfer protocol as well as its own version of the protocol that eliminates some of the CP/M-dictated limitations of Modem 7. Two useful features are the screen save and screen history options that can be invoked at any time using either the file function menu or the ALT-X and ALT-H commands. The screen save does just what you'd think it does; the screen history allows you to scroll through previous screens of your communications with the host computer.

The documentation (an IBM-type three-ring binder and slip-cover) supplied with the PC/Intercomm package is complete and easy to follow. It has a table of contents, an index and a complete appendix, including a troubleshooting guide. I give the typeset manual a four-star rating as the best I've seen for what is often a complex and confusing subject. Another welcome feature is the customer service plan in the back of the manual. It outlines the procedures for getting program assistance and provides a hot-line number to call that connects you with someone in customer support. One caveat: it is not a toll-free number. However, someone will call you back if lines are busy when you call.

Overall, PC/Intercomm sets new standards for ease of use and certainly breaks the price/performance barrier in VT100 capable communications products.

**Douglas Metcalfe  
Chardon, OH**





# EXPRESS CHECKOUTS

## Brief Reviews of Noteworthy Products



### Olivetti M10

**Manufacturer:** Docutel/Olivetti Corp., 5615 Highpoint Drive, Irving, TX 75062.

**Price:** \$799 (8KB RAM), \$999 (24KB RAM); PL10 microplotter, \$260.

In his *Microcomputing* review of the NEC PC-8201A (June 1984, p. 96), Ray Albrektson said the NEC and Radio Shack's TRS-80 Model 100 were as alike as Chrysler and Dodge. Meet the Plymouth.

The Olivetti M10 is the third version of Kyocera Electronics' four-pound, 80C85-based portable to appear in the United States. Unlike the NEC (which offers up to 64KB of bank-switched RAM, two fewer built-in programs and no on-board modem), it's functionally identical to the Tandy machine—there's the modem, a maximum 32KB RAM and address and appointment book programs in addition to a word processor and Microsoft Basic.

The software is the same as the 100's, making the M10 a superb telecommunications and modest word-processing machine if you don't mind the eight-line, 40-column LCD display. Newer portables flooding the office had made me neglect my Model 100 for a while; the Olivetti reminded me what a terrific briefcase aide the Kyocera design is.

The two aren't quite twins, though. The gray and gold Olivetti looks more chic, in a European, high-tech, Porsche sunglasses kind of way; ports on its underside, for adding extra ROM or RAM chips or hooking peripherals to its system bus, are easier to reach, though its parallel, RS-232C port and bar code reader interfaces are upside down.

Most visibly, the Olivetti's LCD is

encased in a clear plastic dust cover and mounted on hinges, letting it tilt up at about a 30-degree angle. Coupled with a contrast adjustment dial and the M10's more steeply angled keyboard, it makes the Olivetti display easier to read. It also makes the machine half an inch thicker in your briefcase.

These differences are in the Olivetti's favor; the Model 100 wins when it comes to keyboard layout. The two keyboards are similar (better function keys and worse arrow keys than the NEC), but the Olivetti's few conveniences—an unshifted colon, some more European characters—are outweighed by its shifted apostrophe, IBM PC-style backslash between the shift and Z keys, less convenient backspace and smaller, awkwardly placed control key.

Radio Shack has thousands more dealers and service outlets, often selling at discounts; this gives Olivetti an uphill battle despite the M10's good looks.

There's one accessory Tandy doesn't offer—the PL10 microplotter, a rechargeable battery-powered device that produces four-color line graphs on 4½-inch roll paper.

The PL10 weighs half a pound and prints neat (if slow) 40-column text; in graphics mode, it prints up to 80 characters of tiny text and plots up to 480 horizontal and 999 vertical steps of .008-inch each. Creating graphs requires long programs of LPrint statements, but the results are reasonably precise and offer lots of flexibility in things like solid versus dashed lines.

Overall, though, the PL10 is something of a novelty; you'd buy something else for serious text printing, and I can't see why you'd fill a

business report with graphs laboriously created on a briefcase micro and plotted on adding machine paper.

E.G.

### Perfect Writer 2.0

**System Requirements:** IBM PC or compatible; 128KB RAM; two disk drives.

**Manufacturer:** Thorn EMI Computer Software Inc., 3187C Airway Ave., Costa Mesa, CA 92626.

**Price:** \$199.

Perfect Writer 2.0 does an amazing job of straddling two extremes: it's easy enough for word processing or computer novices to use without glancing at the manual, yet it's got enough sheer power to match complex bells-and-whistles packages like Microsoft Word. It has a few shortcomings for those of us in the middle, but it's an impressive example of today's new-generation word processors.

The trick to PW2's versatility is a bevy of 29 pop-up menus, the first of which appears when you touch the escape key. Selecting a main menu item (typing its first letter) brings one of several submenus giving more detail about editing functions.

To move the cursor to the next word, for instance, you press escape, F and W—calling the main menu, then the Forward submenu, then executing that menu's Word option. Once you've mastered the mnemonics, you can request a menu delay of one or more seconds, typing command sequences like escape, A, C, L (appearance, center, line) without being distracted by flashing menus.

The menus provide all the options most users will need, but those who want fancy printouts will find Perfect

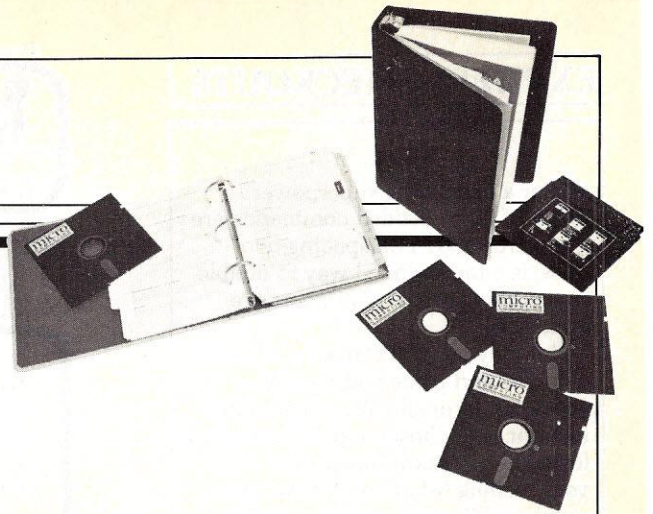


## Microcomputing, October 1984 125



# NEW SOFTWARE

Edited by Amy Campbell



## References Upon Request

When you research or scan reading materials, you know how frustrating it is when an index isn't included. If you're guilty of such reader-hostile practices in your manuscripts, you should know that Emerging Technology's Index (\$95) will create an easy-to-reference index for you. It works with your word processor (if it uses ASCII or IBM extended ASCII files) to create a list of words and page numbers.

Index runs on the IBM PC, TI Professional and DEC Rainbow 100 and can index not only words but also concepts that don't appear in the text. You can index words by either the inclusion method (listing all words to index) or the exclusion method (listing words not to compile). To index concepts, you must embed a macro call either in the text as you compose it or prior to formatting the index. The software indexes the concept by the keyword you've specified in the call.

The software automatically eliminates articles and prepositions in the first sort. You perform additional sorts using the exclusion and inclusion methods.

For more information, contact Emerging Technology Consultants Inc., 2031 Broadway, Boulder, CO 80302.



*MaxThink is the latest entry in CAT (Computer-Aided Thinking) software.*

## Do You Suffer From Brain Drain?

Become a better thinker with MaxThink, an integrated system of advice, programs, commands and word processing to help you plan, develop and direct your thinking.

It includes more than 60 thought processing modules and programs to increase your insights into existing information, help you analyze new ideas and anticipate consequences and risks, as well as analyze the reasoning and arguments of others.

Besides the thought processor capabilities, MaxThink includes a programmable word processor, a language for creating advice systems and an editor for lists, outlines and text.

MaxThink sells for \$249 from MaxThink Inc., 230 Crocker Ave., Piedmont, CA 94610.

## A Sorted Affair

Opt-Tech Sort 2.0 is an easy-to-use 8088 assembly language sort/merge utility for the IBM PC and compatible MS DOS systems. The program can process

fixed and variable-length records on a wide variety of data types, including dBase II files. You can use Opt-Tech Sort as a DOS command or call it as a subroutine. It sorts up to 50 times faster than the DOS Sort Filter command.

The 64KB RAM program sells for \$99 from Opt-Tech Data Processing, PO Box 2167, Humble, TX 77347.

## Enable: Integration With Emphasis On Power

The Software Place's integrated package, Enable (\$695), consists of word processing, spreadsheet, graphics, database management and telecommunications modules, each offering the power of a single-function program. Put them together and you've got what its promotional literature calls "integration without compromise."

With Enable, you can select data from a DBMS file using its powerful query language and graph or insert the data into a spreadsheet with column lengths automatically expanded and formulas automatically recalculated.

You can produce a graph or chart from the spreadsheet, and you can insert information from the database, spreadsheet or graphics modules between text in



the word processing mode. Then you have the option of printing or telecommunicating your finished document.

Enable lets you do three jobs concurrently—work on your spreadsheet, print your monthly report and receive Dow Jones stock quotes over the telephone lines. It can import or export files from dBase II, Lotus 1-2-3, VisiCalc, WordStar, EasyWriter I and Volkswriter.

Other features include a macro facility, automatic use of virtual memory, use of all word processing functions in any application and menu access to DOS utilities. Enable includes form menus for beginners and system-wide direct commands for the expert. On-line help messages and tutorials complement the reference manual. Enable requires 192KB RAM and two double-density disk drives on an IBM PC or selected compatible running MS DOS.

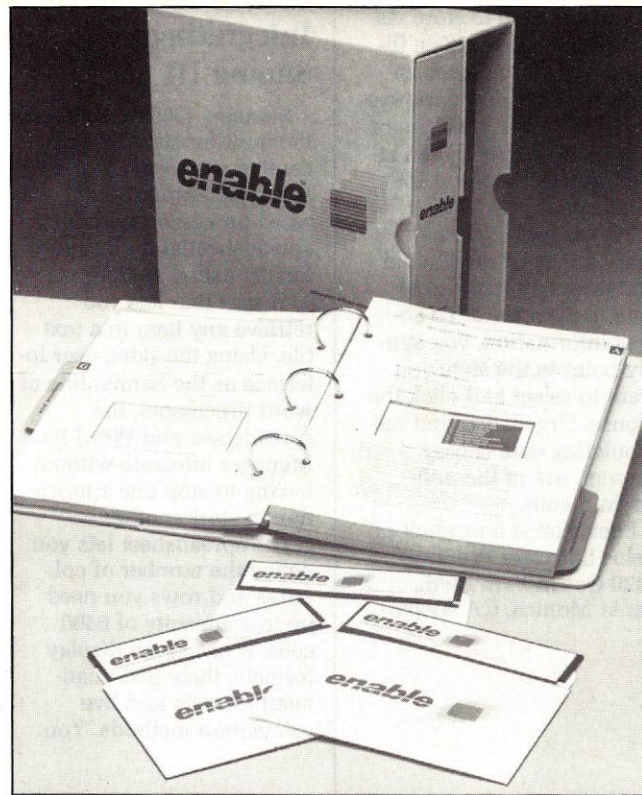
For more information, contact the Software Group, Northway Ten Executive Park, Ballston Lake, NY 12019.

### Different Keystrokes For Different Folks

XtraKey 2.0 (\$49.95) lets you program keyboard macros into your favorite CP/M-80 applications so you spend less time in the hunt-and-peck mode. With it, you can combine often-used commands and/or text into one or two keystrokes.

Unlike other programs that substitute for keyboard input, XtraKey can also send character strings directly to the printer and video display. The XtraKey custom feature (available currently for Kaypro and Gnat 10 systems only) with a built-in screen dump function lets you redefine the numeric keypad and cursor keys.

Standard features include



With Enable, you can integrate applications through the use of up to eight separate windows.

the ability to turn a printer on and off from within a program, a clear screen function, key definitions that chain to other key definitions, unlimited string lengths and backspace correction. Up to eight complete on-line key definition sets can be active at any time.

XtraKey comes with predefined key definition files for programs such as dBase II, WordStar, Perfect Writer, MBasic and Perfect Calc from Xpert Software, 8865 Pollard Ave., San Diego, CA 92123.

### Your Z80 Can Lisp

A new implementation of Lisp for CP/M 2.2, iLisp (\$49.95), offers the traditional advantages of Lisp programming—extensibility, modularity of code and a flexible and highly interactive programming environ-

ment. Based on the Scheme dialect, iLisp offers advanced Lisp features, such as run-time Lisp macros and input-time Read macros, stack-free execution of tail-recursive functions and complete access to the CP/M file directory. It also supports sequential and byte-addressable random input/output to disk files, floating point and integer arithmetic, programmer control of the executive, error handling and start-up functions as well as an assembly language interface and debugging utilities.

Included is documented source code for all iLisp utilities (editor, library, print utility and Eliza—a psychotherapy parody) and a 165-page reference manual. iLisp is available on both eight-inch and 5¼-inch disk formats, including Kaypro, Morrow, Zenith and Osborne, from Computing Insights, PO Box 4033, Madison, WI 53711.

### CP/M Word Processor Utilities

Elliam Associates has released WP-Helper, a collection of file utilities for use with your CP/M word processor. The package comes with ten programs on disk and two sample test files as well as a 35-page manual.

The Match utility reports any unmatched print control characters and helps you define other characters that must occur in pairs. The Sort utility works with MailMerge name and address files to sort records in ZIP code or last name order.

The Count utility counts lines, words and characters in an ASCII data file. It lets you ignore or include numbers or any selected characters and count paragraphs in a WordStar file.

Head and Tail are two similar programs that display the beginning and end of a file on the screen. All programs use the same user interface. You execute them by entering the program name, and a menu of options appears.

The package sells for \$29.95 plus \$1.50 postage and handling from Elliam Associates, 24000 Bessemer St., Woodland Hills, CA 91367.

### The Right Writing Tools

Just like the guy who asked his doctor if he could play the piano when his cast came off... buying a computer won't make writing letters and reports easier if you never knew how to write (or play the piano) in the first place. So, the folks at Roger Wagner publishing have put together a package for Apple owners aimed at getting your writing and word processing skills up to snuff.

The Write Choice (\$44.95) is a full-feature word



processor for the Apple II family of computers that includes a typing tutor (with 24 lessons each for both the Qwerty and Dvorak keyboards), comprehensive documentation that includes a typing style guide and a complete copy of *The Elements of Style* by Strunk and White. Also included is a utility to determine the readability value and word count of your documents.

Roger Wagner Publishing Inc. is headquartered at 10761 Woodside Ave., Suite E, PO Box 582, Santee, CA 92071.

## Filevision for The Macintosh

A new filing system for the Macintosh, Filevision (\$150), combines the ability

of the machine to store visual and text data. It's a filing program that uses an object-oriented drawing system. You draw a picture of a particular object, then attach files of data to it for reference.

For example, you can draw a map of the United States and attach files of data to each state. To access information, you simply point to the state you want to select and click the mouse. Organizing and manipulating data is easy through use of the pull-down menus.

Filevision is a product of Telos Software Products, 3420 Ocean Park Blvd., Santa Monica, CA 90405.

## Integrating Samna III

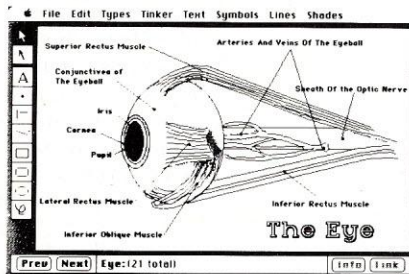
Samna + (\$695) combines the multifunction text processing power of Samna Word III (Samna's high-end word processor) with a spreadsheet and a new facility called Word Base Manager that lets you retrieve any item in a text file. Using the same user interface as the Samna line of word processors, the spreadsheet and Word Base Manager integrate without having to stop one application to start another.

The spreadsheet lets you define the number of columns and rows you need up to a capacity of 6400 cells. It has seven display formats, three text alignment formats and five calculation methods. You

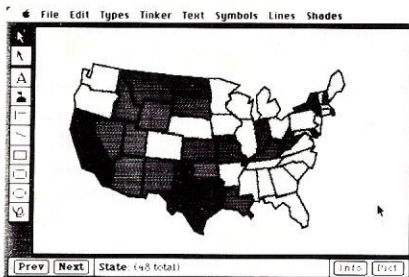
can create a spreadsheet from within a text document, for example.

The Word Base Manager indexes every word on a disk and can locate words, phrases or logical pairs of words or phrases in seconds. It can search for logical pairs of words or phrases such as "chemical engineering" and "Middle East" within one line of each other or as much as 100 lines apart. It can cite the location of each occurrence, report the filename, page number and line number of each or display the first occurrence found and place the cursor on the reference while it searches for the next occurrence.

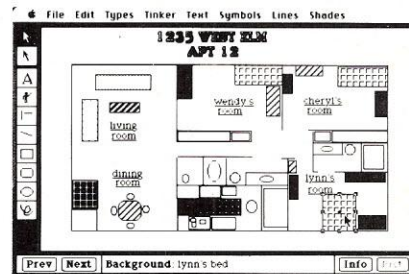
For more information on the Samna + package available for the IBM PC and compatibles (and the TI Professional and DEC Rain-



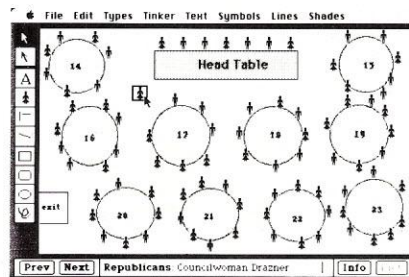
Create technical illustrations or pictures of science class projects, with ease. Whatever you need to remember about your picture, Filevision lets you store on forms connected to it. And retrieve in the click of a mouse.



Map out sales territories. Sift out subdivisions for direct-mailings. Or search out the states that participated in the French and Indians Wars. Filevision makes your requests pop off the screen. In the click of a mouse.



Organize office space by department. Diagram a summer home. Even create a play book for your football team. It's a breeze with Filevision.



Plan a political fund-raiser with Filevision, and seat the non-smoking Independents away from the smoking Republicans. Or, click to see which blocks of seats have been reserved at your dinner theater.

With Filevision you can use screens like these to create file categories on the Macintosh.



bow 100 by the end of year), contact Samna, 2700 N.E. Expressway, Suite C-700, Atlanta, GA 30345.

### The Boss of Spell Checking

WordPlus-PC with the BOSS (built-in on-line spelling system) is more than a word processor with a spell checker. The two work together as a total word processing system that checks and corrects spelling at any time during the editing of a document. The BOSS locates and highlights misspelled words on the screen at the touch of a button. You can then ask for suggestions for proper spelling. The BOSS offers an on-screen window with up to eight spelling suggestions. An automatic correct feature lets you automatically fix the misspelled words. The dictionary contains 90,000 words, and you can add up to 10,000 custom words, terms and abbreviations.

WordPlus-PC, featuring the BOSS for the IBM PC and compatibles, TI Professional and DEC Rainbow

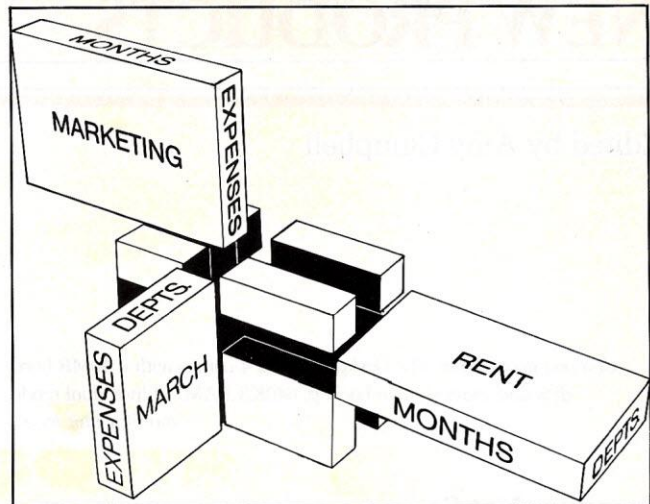
100, sells for \$495 from Professional Software Inc., 51 Fremont St., Needham, MA 02194.

### Putting It On the Tables

TM/1 (Tables Manager/1) is a new design in database structure that uses multidimensional tables to store and manipulate information and concepts. It's a decision support system that offers the same control over dimension and perspective that the electronic spreadsheet does for data.

You can use a table to represent information using the same familiar terms you use to run your business. Terms like payroll, rent and travel are all part of a dimension called expenses. Marketing, manufacturing and research fall under the dimension department. TM/1 lets you manage concepts on your computer the way you think of them in business.

With TM/1 (\$795), you can define tables with as many dimensions as your business has. And you can display them in any combination, two at a time, on a spreadsheet. Designed for



The Tables Manager/1 handles your data in unique multidimensional relationships.

the IBM PC, XT and compatibles, TM/1 features a tabular database structure geared towards planning and analysis. It can aggregate and post detailed statistics into a tabular structure, compare and manipulate data on several different planes. All these functions and more are available on one virtual memory database.

You can access up to 20 eight-dimensional tables at one time. Each dimension can handle up to 9999 ele-

ments. Requirements include 192KB RAM and DOS 2.0. For more information, contact Sniper Corp., 14 West 40 St., New York, NY 10018.

*Microcomputing prints information on new software based on information supplied to us by manufacturers. Inclusion of a product does not signify an endorsement.*

### Updates and Price Cuts

Samna has lowered the price of its top-of-the-line word processor **Samna Word III** from \$650 to \$550. They have also added spell checking and correction, support for DOS 2.0 directories and subdirectories, undo commands and proportional printing to **Samna Word II** for its same \$450 price tag. Samna has announced compatibility of its products with IBM's DISOSS (Distributed Office Support Software) by the second quarter of 1985 and plans to support a local area network standard in the future. (Samna Corp., 2700 N.E. Expressway, Suite C-700, Atlanta, GA 30345.)

Power-Base Systems has made major enhancements to its \$395 **Power-Base** database manager. These include Power-Links, which transfer files between Power-Base and selected word processing; spreadsheet, graphics and database programs; a mailing labels generator; global replace and recalculation functions; and an updated Report Writer that can create sophisticated reports from multiple files.

The enhancements are free to registered users. (Power-Base Systems Inc., 12 West 37th St., New York, NY 10018.)

MultiMate International has released version 3.22 of **MultiMate**. In addition to a newly organized manual with a separate training tablet and disk tutorial, MultiMate claims to have ironed out problems in the repagination process, added helpful screen messages to the merge function and made the program run faster. Added functions allow you to change tabs or margins in the format line, use dots to represent spaces on the screen, change main and custom dictionaries, print to disk instead of to the printer and change default settings for page size and format line in the file conversion utility. MultiMate 3.22 requires 256KB RAM on all DOSes.

The update is free, as part of MultiMate's new five-year guarantee that gives MultiMate customers two free updates (subsequent updates are \$50 each). (MultiMate International Corp., 52 Oakland Ave. North, East Hartford, CT 06108).



# NEW PRODUCTS

Edited by Amy Campbell

*Compaq gets bigger: The Deskpro Model 4 comes with a 10MB hard disk and mass storage backup, 640KB RAM, 12-inch dual mode monitor and more.*



## Compaq: Not So Compact Anymore

The company whose success stemmed from selling a liberating pack-up-and-go clone is now betting on a more conservative line of desktop computers with an emphasis on speed, expandability and compatibility. Compaq Computer Corp. promotes its DeskPro line as the only 8086-based machines compatible with all popular IBM-compatible software and hardware.

The 8086 gives the new Compaq improved performance over 8088-based machines when running newer sophisticated integrated software. A dual-mode monitor can run both high-resolution PC-compatible text and graphics on the same screen.

The DeskPro comes in four models. The Model 1 (\$2495) includes a dual-mode monitor, 128KB RAM, two 360KB disk drives, a keyboard, interfaces for a parallel printer, an RGB color video monitor, a composite video monitor and an rf modulator as well as six expansion slots. The Model 2 (\$2295) is the same but with 256KB RAM.

The Model 3 (\$4995) with 256KB RAM adds a 10MB hard disk and an asynchronous communications/clock board. It has four expansion slots available. The top-of-the-line Model 4 (\$7195) adds a 10MB hard disk backup and has a total RAM of 640KB.

Compaq Computer Corp. is located at 20333 FM149, Houston, TX 77070.

## High Resolution On Your TRS-80

The Grafyx Solution add-on board gives any TRS-80 Model 4 (a Model III version is also available) a 640×240 pixel resolution for a total of 153,600 individually accessible points. It fits inside the computer and plugs into the TRS-80 graphics connector.

Forty programs and files are included on disk and serve as practical applications, demonstrations and programming examples. The software is compatible with TRS DOS 1.3/6.1, LDOS, New DOS80 and DOS Plus.

Also included is an Extended Graphics Basic that adds more than 20 commands to the Basic language. These commands set, clear or complement points, lines, boxes, circles, ellipses or arcs. You can fill areas with any of 256 patterns. You can save sections of the screen, print the hires screen or change the dot density.

The Grafyx Solution costs \$199.95 from Micro-Labs Inc., 902 Pinecrest, Richardson, TX 75080.

## Microsoft Add-On For IBM PCjr

Microsoft has released an expansion card for the IBM PCjr that adds 128KB RAM and support for the Microsoft Mouse. With the card,

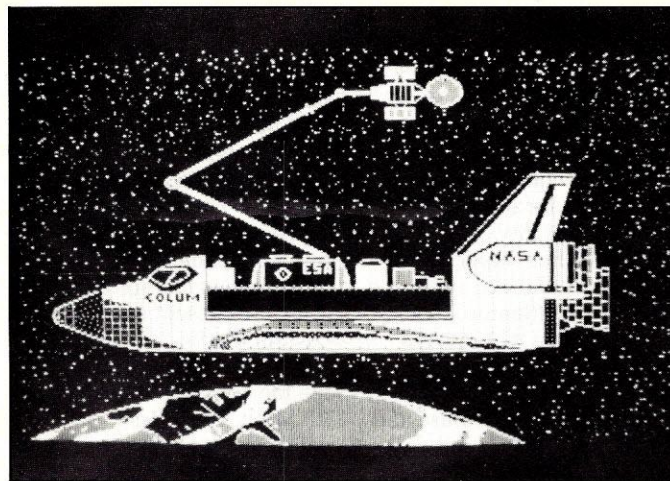
called the Microsoft PCjr Booster with Mouse (\$495), the PCjr can run larger and more sophisticated programs, such as Microsoft Word, Lotus 1-2-3, and languages such as Fortran and Pascal. Programs requiring less than 128KB operate faster with the Booster card installed.

Bundled software includes a mouse driver, Mouse Menu, Piano, Life, Doodle, RAMDrive, Clock/Calendar, example configuration files and JBasic—a software enhancement to the MS Basic cartridge sold for the PCjr. Microsoft Corp. is located at 10700 Northup Way, Bellevue, WA 98004.

## Model 100 Portable Disk Drive

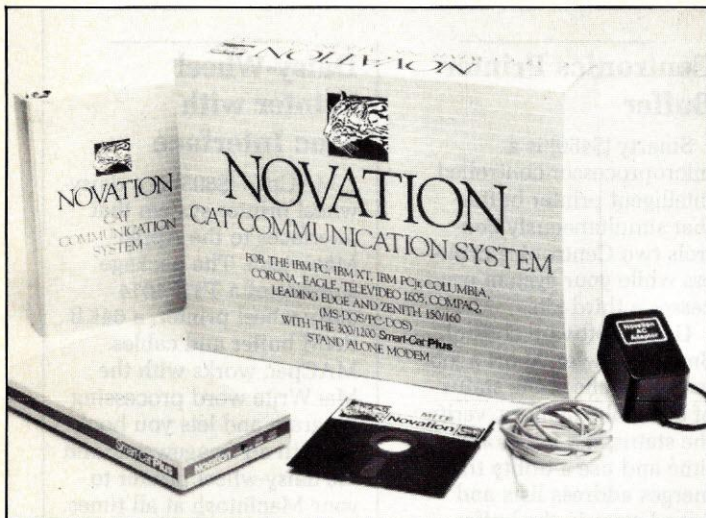
The Chipmunk (\$550) is the name of Holmes Engineering's 3½-inch portable disk drive for the Radio Shack Model 100. It comes ready to plug into the computer with Disk Basic and a menu-driven operating system. It runs on built-in rechargeable batteries or an ac adapter.

It fits in a briefcase with the Model 100. You can use additional drives plugged into the Chipmunk for more storage capacity. For further information, contact Holmes Engineering Inc., 5175 Greenpine Drive, Murray, UT 84123. Reader Service number 428.



*An example of TRS-80 Model 4 graphics using the Grafyx Solution add-on board.*





Novation's Cat Communications System consists of a Smart-Cat-Plus modem, MITE communications software, cable, adapter and manual.

## Novation Cat Communications System

The Cat Communications System (\$499) from Novation is everything you need to telecommunicate... all in one box. Each system includes the Smart-Cat-Plus modem, the easy-to-use MITE data communications software and an operating manual. The internal modem card occupies one slot on your computer, uses serial port addresses COM1, COM2 or COM3 and supports audio call monitoring with volume control using the computer's speaker (IBM machines only). The external modem interfaces via an RS-232C port.

A CMOS LSI-designed 300/1200 bps modem, the Smart-Cat-Plus has true dial tone detection, busy signal detection, alternate number dialing, automatic selection of best dialing mode (touch or tone) and self testing.

The external modem works with the IBM PC, XT or PCjr, Columbia, Corona, Eagle, TeleVideo 1605, Compaq, Leading Edge, Zenith 150/160 and the DEC Rainbow running MS DOS and CP/M-86, and with the Kaypro 2/4/10 running CP/M. The internal modem operates with the IBM PC and XT, Columbia, Corona,

Eagle and Compaq running MS DOS and CP/M-86. For more information, contact Novation, 20409 Prairie St., Chatsworth, CA 91311.

## Low-Cost Modem

The Intec 300 is, as you would surmise, a 300 bps modem. It comes with software and interface connections compatible with the TRS-80 Model III/4, Kaypro 2/4/10, IBM PC and the Apple II family of computers; the modem has autolog, autodial and autoretrial support. Other features include: direct data capture to disk file, data capture to memory buffer, on-line display of capture buffer and optional linefeed add/delete function. It transfers files via the XModem protocol and supports non-ASCII (binary) file transfer.

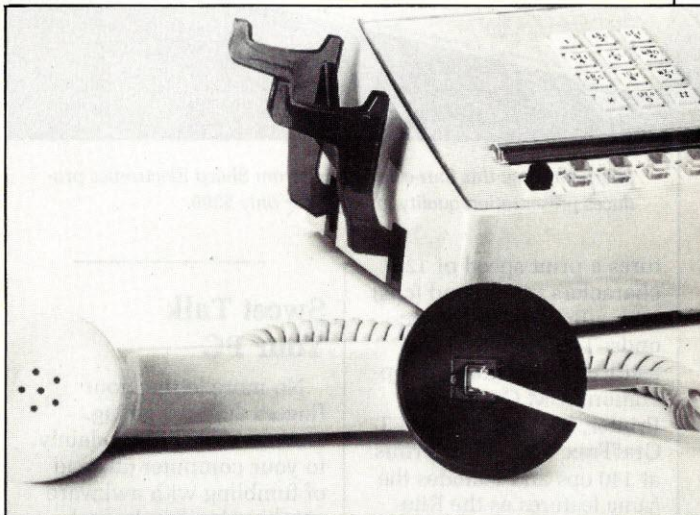
While on-line, you can switch between originate and answer, select duplex/half-duplex mode, select parameters and list selected parameters. It also supports unattended operation. The external modem costs \$189 and the modem card retails for \$169. For more information, contact Intec Corp., PO Box 5164, West Bloomfield, MI 48033.

## Telephone Modem Attachment

The Black Jack (\$49) lets you use your portable computer and modem with any telephone—even those in hotels and phone booths. To attach it to the telephone, unscrew the telephone mouthpiece and microphone and replace it

with the Black Jack. You can then insert the RJ11C direct connect line cord from your modem and dial.

You can dial numbers on your computer if the telephone has touch-tone dialing. If not, simply dial from the telephone. For more information, contact Jensen Tools Inc., 7815 S. 46th St., Phoenix, AZ 85040.



The Black Jack lets you connect your modem to nonmodular telephones.

## A Sharp New Printer/Plotter

Sharp Electronics has introduced a four-color plotter bundled with graphics software for \$399. The CE-515P produces presentation-quality graphics and text plotting using black, blue, green and red inks. You can program the plotter to automatically change colors. It accepts paper up to 8½-inches wide and can also plot on postcard-sized documents.

The pens' minimum shifting width is 0.2mm, allowing them to produce alphanumeric characters 0.8mm wide by 1.2mm tall (in the four-step by six-step mode). The software, KeyChart by SoftKey, works with the IBM PC and compatibles. Other features include built-in Circle, Paint and Axis commands.

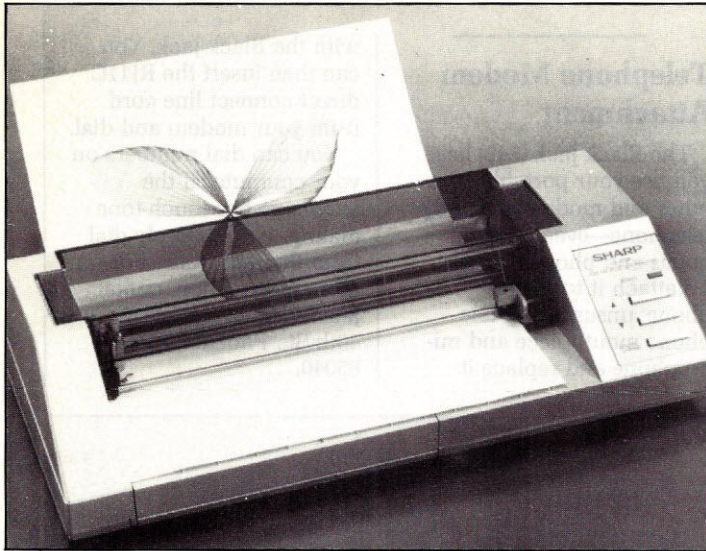
The plotter interfaces via RS-232C and Centronics-style parallel ports. Most personal computers using Basic can drive the CE-515P using a printer interface card or I/O port. For more information, contact Sharp Electronics, Systems Division, 10 Sharp Plaza, Paramus, NJ 07652.

## Four Printers From Riteman

Four speedy, compact and economical dot-matrix printers, The Riteman Plus (\$399), The Riteman Blue Plus (\$499), The Riteman II (\$549) and The Riteman 15 (\$799) comprise the latest line from Riteman Computer Printers.

The Riteman Plus fea-





Sharp plotting: this four-color plotter from Sharp Electronics produces presentation quality graphics for only \$399.

tures a print speed of 120 characters per second (cps) with a linefeed of .10 seconds. The Riteman Blue features three modes of operation: IBM Graphics Printer, RX- and MX-80/FT GrafTrax Type III. It prints at 140 cps and includes the same features as the Riteman Plus.

The Riteman II prints at 160 cps and is available in both 2KB RAM and 8KB RAM (\$599) versions. The top-of-the-line Riteman 15 is a wide-carriage model that also prints at 160 cps and is available in 2KB RAM and 8KB RAM (\$849) versions.

All versions are physically smaller than their Epson counterparts, yet they have a faster throughput, replaceable ribbon cartridges, steel printer head cables, and both friction and pin feed with an option for an adjustable tractor feed. You can tear off paper one inch from the print head, which means no paper waste. Dip switches are on the outside panel and easy to access. The Riteman 15 weighs 19.4 pounds. The other models weigh 11 pounds each and will fit in a three-inch briefcase.

Write to Riteman Computer Printers at Airport Business Park, 431 North Oak St., Inglewood, CA 90302.

## Sweet Talk Your PC

No more letting your fingers do the walking. Now you can speak plainly to your computer (instead of fumbling with awkward combination keystrokes) thanks to IntroVoice III. The intelligent voice/keyboard for the IBM PC and XT lets you enter data and execute commands by voice alone or in combination with keyboard data entry.

IntroVoice III hears you, understands you and responds to your verbal commands (probably unlike a lot of people you know). It can understand up to 100 words or phrases that you select. Plug IntroVoice III and microphone into your IBM, insert the disk and then run any IBM PC program.

The keyboard houses the voice recognition circuitry and places the shift and return keys in standard typewriter position. It comes with documentation, support software and all components for immediate use.

To order, contact The Voice Connection, 17835 Skypark Circle, Unit C, Irvine, CA 92714.

## Centronics Printer Buffer

Smarty (\$450) is a microprocessor-controlled intelligent printer buffer that simultaneously controls two Centronics printers while your system processes a third job.

Under software control, Smarty lets you abort a job instantly, check the status of available memory, verify the status of a job at any time and use a utility that merges address lists and form letters in the buffer.

Buffer spaces for each printer are variable. Smarty supports a two-way communication protocol with the buffer via a unique ASCII command structure that ensures communication between the operator and the system. Smarty comes with 64KB RAM (256KB RAM optional) and is available as a five by seven-inch stand-alone unit or as an add-on board.

Smarty is sold by Phoenix Electronic Development Corp., 618 Venice Blvd., Marina del Rey, CA 90291.

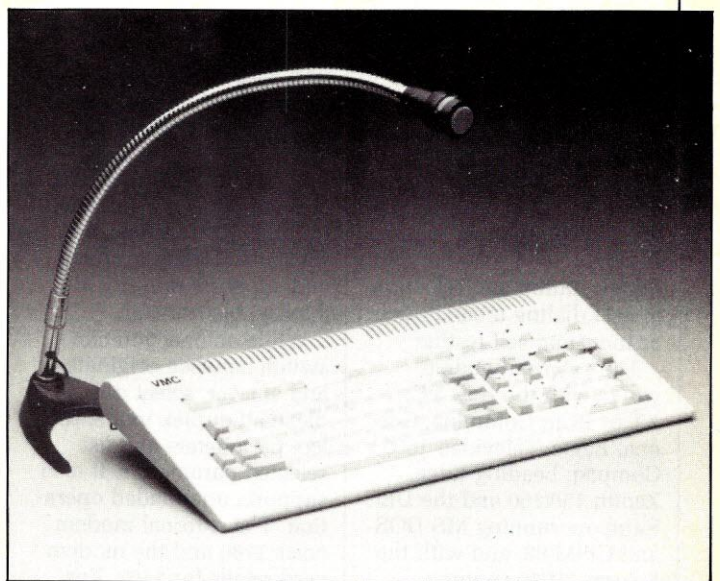
## Daisy-Wheel Printer with Mac Interface

MACpac (\$895) is a daisy-wheel printer system that interfaces to the Apple Macintosh. The package consists of a TTX 1014 daisy-wheel printer, a 64KB RAM buffer and cables. MACpac works with the MacWrite word processing program and lets you hook up both an Imagewriter and the daisy-wheel printer to your Macintosh at all times.

A buffer connects the MACpac to the Macintosh serial port and provides either parallel (TTX 1014) or serial (Imagewriter) output. It accommodates data rates from 50 to 19.2 bps. The buffer also lets your Mac handle other tasks while the printer makes multiple copies.

The 14 cps TTX 1014 features a 14 $\frac{1}{8}$ -inch platen, bidirectional printing, a pin-feed forms guide and variable pitch and line spacing. TTX Inc. is located at 3420 East Third Ave., Foster City, CA 94404.

Microcomputing prints information on new products based on information supplied to us by manufacturers. Inclusion of a product does not signify an endorsement.



Testing 1, 2, 3: this keyboard/microphone combo gives your IBM PC or XT and applications software a speech interface.



**EXPERT COMPUTERS** often saves system integrators, software consultants, and small dealers thousands of dollars. And not just with low pricing.

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If you can't afford to buy one of each item just to test it, call us as **TECH SUPPORT/CUSTOMER SERVICE: (818) 344-6063**.

## IBM

#1 <b>PC</b> : 256K, 2 drives, <b>graphics</b> adaptor.....	\$2000
#2 <b>PC</b> : 256K, 2 drives, <b>monochrome</b> / printer port.....	\$2100
PC <b>PORTABLE</b> : 256K, 2 drives.....	\$2500
#1 <b>XT</b> : 256K, 1 drive, 10MByte Fixed, <b>graphics</b> adaptor.....	\$3900
#2 <b>XT</b> : 256K, 1 drive, 10MByte Fixed, <b>mono</b> / printer.....	\$4000

## TAVA

Why we recommend TAVA:

1) TAVA is so compatible, the only sacrifice is you have to shave your Charlie Chaplin moustache.

2) TAVA has continually upgraded. The keyboard is improved. The drives are thinline **TEAC's**. The new **COLOR** is **SPECTACULAR**. IBM, Columbia, Compaq, Corona, and others have made almost no changes over the past year.

3) The power supply is strong enough to add a hard drive or other internal option.

4) TAVA is not afraid to compete on **PRICE** and features.

#1 **TAVA**: 256K, Serial, Parallel, 2 Drives, **Graphics** Video, 12" Green CRT.....

#2 **TAVA**: 256K, Serial, Parallel, 2 Drives, **Monochrome**, 12" Green CRT.....

#3 **TAVA**: 256K, Serial, Parallel, 2 Drives, 640 x 400 Color, 26 MHz RGB Color Video.....

Our TAVA's have the improved keyboard!

## LINKNET (tm)

### PC Network Terminal

This is an IBM-style computer with **NO DRIVES**, 128k (expandable to 256K on-board), 5 expansion slots (1 used for video interface), printer port, and serial port. Why buy a computer with **NO DRIVES**? Because it is the perfect **NETWORK DESKTOP WORKSTATION**.

Add any **NETWORK CARD** to make an inexpensive full-featured workstation. Then, if you like, you can still exchange VIDEO cards, add HARD DISK, ext. For speed, add an 8087 CO-PROCESSOR or a RAM DISK.

\$995 (includes 12" Green CRT)

## SANYO

SANYO MBC 550-2.....	\$ 915
SANYO MBC 555-2.....	\$1220
SANYO SERIAL PORT.....	\$ 65
10 MBYTE EXTERNAL HARD DISK.....	\$1265
DUMP: Graphics to printer.....	\$ 45
ADD-ON TEAC D5DD DRIVE with instructions.....	\$ 165

## NEC APC

#HO1 1 DRIVE, GREEN.....	\$2135
#HO2 2 DRIVES, GREEN.....	\$2625
#HO3 2 DRIVES, COLOR.....	\$3235
#HO4 1 DRIVE, COLOR.....	\$2635

## NEC APC-III

#H102M 2 DRIVES, MONO.....	\$1916
#H102C 2 DRIVES, COLOR.....	\$2316
#H111M 10MB, MONO.....	\$3196
#H111C 10MB, COLOR.....	\$3596

UNIX SPECIAL-MONO: 256K RAM, PC-UX, #H111M, PC-UX BOARD.....

UNIX SPECIAL-COLOR: WITH #H111C.....

## NEC PC8201

The "lap computer" that beats Radio Shack.....

## IBM OPTIONS

<b>VIDEO CARDS</b>	
MA PEACOCK with printer.....	\$265
PARADISE Multidisplay.....	\$295
PLANTRONICS Colorplus.....	\$365
PERSYST BoB with TAXAN #440 RGB.....	\$975
TECMAR Graphic Master.....	\$485
EVEREX Graphic Edge.....	\$420
TSENG LABS UltraPAK.....	\$485
PROFIT SYSTEMS Multigraph.....	\$395
CCS SUPERVISION with Graphics.....	\$725
HERCULES Graphics Card.....	\$325
STB Graphic Plus.....	\$375
PRINCETON GRAPHICS Scan Doubler.....	\$175

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### Recommended network for dBase III!

ETHERLINK.....	Card for each PC.....	\$595
ETHERSTART.....	Bootless ROM.....	\$ 90
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BNC TERMINATOR KIT.....		\$ 35
CABLES: 10' = \$36 50' = \$39 100' = \$49		

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BLOSSOM-64.....	64K, par, serial, clock.....	\$255
PC-NET.....	piggybacks onto Blossom.....	\$405
BLOSSOM-64 WITH PC-NET.....	both above items.....	\$595

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<b>AMDEK</b>	
300G.....	\$135
300A.....	\$145
310A.....	\$180
COLOR CRT'S - not recommended	
<b>PRINCETON GRAPHICS</b>	
SR-12.....	\$615
HX-12.....	\$465
MAX-12.....	\$190
SCAN DOUBLER.....	\$175
<b>ROLAND</b>	
Green MB-122G.....	\$165
Amber MB-122A.....	\$175
<b>SAKATA</b>	
SG-1000 Green.....	\$105
SA-1000 Amber.....	\$115
SC-100 13" Composite.....	\$245
SC-200 RGB for IBM.....	\$455
<b>TAXAN</b>	
#115/#116 We recommend Sakata	
#121 (like IBM green).....	\$150
#122 (like #121, amber).....	\$160
#415 RGB with cable for Sanyo.....	\$395
#420 RGB with cable for IBM.....	\$435
#440 RGB for Persyst BoB.....	\$575

## PRINTERS

D = DAISYWHEEL M = DOT MATRIX

<b>BMC</b> CP-80.....	(m) Mylar ribbon!.....	\$265
<b>BROTHER</b> HR-15.....	(d).....	\$395
<b>TRACTOR</b> .....		\$105
<b>CUT SHEET FEEDER</b> .....		\$185
<b>C ITOH</b> 1 YEAR WARRANTY		
F-10-40.....	(d).....	\$ 930
F-10-55.....	(d).....	\$1275
<b>TRACTOR</b> .....		\$ 175
#8510P.....	(m).....	\$ 345
#1550P.....	(m).....	\$ 575
<b>DAISYWRITER</b>	(d) with PC cable.....	\$ 675
<b>EPSON</b>		
FX-80 (m).....		\$ 410
FX-100.....	(m).....	\$ 695
LO-1500.....	(m).....	\$1295
<b>IDS PRISM</b> 132C.....	(m).....	\$1375
<b>JUKI</b> 6100.....	(d).....	\$ 425
<b>OKIDATA</b> #92-PC.....	(m).....	\$ 415
#93-PC.....	(m).....	\$ 685
<b>SILVER-REED</b>		
EXP400.....	(d).....	\$ 325
EXP500.....	(d).....	\$ 375
EXP550.....	(d).....	\$ 440
<b>TRACTOR</b> .....		\$ 145
<b>CUT SHEET FEEDER</b> .....		\$ 295
<b>STAR MICRONICS</b> 180 DAY WARRANTY		
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GEMINI-15X.....	(m).....	\$ 385
DELTA-10.....	(m) 160cps, parallel and serial, 8K buffer.....	\$ 395
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PC GEMINI-10X.....	(m) More PC compatible than Epson!.....	\$3997
PC GEMINI-15X.....	(m) With Corrected graphics!.....	\$5497
PC DELTA-10.....	(m).....	\$5497
PC DELTA-15.....	(m).....	\$7997
PC RADIX-10.....	(m).....	\$8497
PC RADIX-15.....	(m).....	\$9957
<b>POWER TYPE</b>	(d) 18 cps, parallel and serial, Qume wheels.....	\$ 385
<b>Tractor</b> .....		\$ 59
<b>RADIX-10</b> .....	(m) 200 cps, parallel and serial, 16K buffer.....	\$ 585
<b>RADIX-15</b> .....	(m).....	\$ 650
<b>MACINTOSH INTERFACE</b> .....	Full support.....	\$ 119
<b>TOSHIBA</b> #P-1340.....		\$ 775
#P-1351.....		\$1275

## RAM SETS

64K (200ns).....	\$49
64K (150ns).....	\$55

## dBASE III AND FRAMEWORK

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When you buy a fresh copy of WORD WITH MOUSE at the low price of **\$285**, we will include without extra charge a copy program which makes functional backup copies. **IT WILL ONLY COPY AN ORIGINAL, NOT A COPY.**

## MODEMS

<b>HAYES</b> 1200 SMARTMODEM.....	external.....	\$450
<b>HAYES</b> 1200B w/Smartcom.....	PC external.....	\$395
<b>HAYES</b> MICROMODEM II/E w/SMARTCOM.....	Apple internal.....	\$245
<b>NOVATION</b> ACCESS 1-2-3.....	PC internal.....	\$435
<b>PROMETHEUS</b> PROMODEM 1200.....	external.....	\$375
<b>QUBIE</b> 1200B.....	PC internal.....	\$275
<b>QUBIE</b> 1200.....	external.....	\$310
<b>SIGNALMAN</b> MARK XII.....	external.....	\$240

## PC KEYBOARDS

<b>KEYTRONIC</b> 5150.....	\$175
<b>KEYTRONIC</b> 5151.....	\$195
<b>QUBIE</b> FINGER FRIENDLY.....	\$165

## GILTRONIX A-B SWITCH

Cable 2 printers to one computer port. This unit switches all 25 lines, making it compatible with parallel and serial peripherals. Price includes one cable with male DB25, usually for IBM printer port.

\$155

## TEAC 55B

DOUBLE SIDED THINLINE 5-1/4" DRIVE.....	\$155
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## DISKETTES

<b>PLATINUM</b> (Capitol) DSDD.....	\$40
<b>VERBATIM</b> DATA LIFE DSDD.....	\$32
<b>DYSAN</b> DSDD.....	\$34

## SOFTWARE

<b>dBASE</b> III.....	\$485
<b>FRAMEWORK</b> .....	\$485
<b>SYMPHONY</b> .....	\$485
<b>COPY DISK</b> .....	\$ 55
<b>MJA ACCOUNTING</b> - 5 MODULES.....	EACH \$395
<b>WORD WITH MOUSE</b> .....	\$285

# RAM SETS

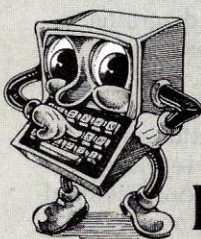
**64K (200ns) . \$49**  
**64K (150ns) . \$55**

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<b>DBMS</b> .....	<b>dBASE</b> III
<b>FLOPPY DISK DRIVE</b> .....	<b>TEAC</b> 55B
<b>INTEGRATED PACKAGE</b> .....	<b>FRAMEWORK</b>
<b>MODEM</b> .....	<b>PROMETHEUS</b>
<b>NETWORK</b> .....	<b>3COM</b>
<b>PRINTER - MATRIX</b> .....	<b>IDS</b> PRISM
<b>PRINTER - DAISY</b> .....	<b>C. ITOH</b> F-10
<b>PC VIDEO-COLOR</b> .....	<b>PERSYST</b> BoB w/TAXAN #440
<b>PC VIDEO-MONO</b> .....	<b>TSENG</b> LABS
<b>PC COMPATIBLE</b> .....	<b>ULTRAPAK</b>
<b>VALUE</b> .....	<b>TAVA</b>
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**17314 CRENSHAW BLVD.**  
**TORRANCE, CA 90504**

Prices may change - confirm by phone. 2% fee for VISA / MasterCard. 4% fee for American Express. 20% non-refundable deposit required on COD orders. California resident add sales tax. 15 DOA warranty: Call TECH / SERVICE to obtain return authorization - we will repair or replace at our option. This warranty is in addition to manufacturer's warranty.

Circle 160 on Reader Service card.



# BOOK REVIEWS

Edited by Nancy Kipperman

## **Systems Development Without Pain: A User's Guide to Modeling Organizational Patterns**

Paul T. Ward  
Yourdon Press, 1984  
1133 Avenue of the Americas  
New York, NY 10036  
Softcover, 272 pp., \$27.50

Dr. Ward has 20 years of experience in the data processing field and has worked since 1981 as an instructor and consultant for Yourdon inc. Most recently, he was named technical director for Systems Development.

He has divided his book into five major sections. The first section is primarily an introduction to problems that exist in systems development and what model building is all about. The second section details what tools are needed to build models and the different types of schemes needed for the complete model.

Section 3 covers the model-building process and describes the major models involved in developing a total system. Going beyond the basics is the topic of the fourth section, and it deals with some added features to enhance the model-building process. Finally, the fifth section addresses organizing the people and work into the total model, using both horizontal and vertical organization techniques.

### **So What?**

So what? you might ask. Just what does all of that mean? The job of data processing systems analyst has been one of taking a system, payroll for instance, and defining just what takes place in that system in enough detail to understand how it works. But the analyst must go beyond just understanding how it works; he has to be able to document it so that

others can understand its operation by looking at the document.

Producing this document has been a problem because it has to do a multitude of things. It has to describe the flow of documents, both into and out of the system. It has to describe what data those documents contain and who enters, corrects and receives the data. It has to describe the formal and informal flow of the documents in the department and what action takes place, depending on all of the input or lack of input.

In short, it has to describe in enough detail all of the actions of the department so if everyone left, the document could act as the basis of the instructions to the new employees.

### **Use of Model**

Basically, that's what this book, and many other books, have attempted to describe—a "how to" approach to just what is required to document a system. All methods attempt to define a model of some sort. Dr. Ward's model uses somewhat free-form diagrams to represent the structure.

As a matter of fact, they are primarily circles and arrows. Circles represent a function or person and the arrow(s) represent flow or communication. The modeling tools of process schemas, data schemas, data descriptions, process descriptions, and method of presentation of the model are the heart of the modeling process.

The most important test of a model, regardless of the design of the model, is does it effectively describe the system, and from it can you simulate the real world system it's trying to represent? When you look at all of the complexities of a system, it's not an easy task.

Does Dr. Ward's book really allow you to represent the whole system in an easy-to-understand

way? I'd say yes—in a qualified way. The book is presented in an easy-to-read format with many examples to illustrate the model he's proposing. He uses a new method for developing systems called "A Systems Modeling Language" or ASML. Dr. Ward feels a new method is needed because the traditional methods aren't powerful enough to describe large organizational systems effectively. It's also necessary for the users to become involved, as the ultimate consumers of the model, to obtain the full value of the system. The final goal is, of course, to develop large systems without major errors, which will reduce the backlog of the data processing department. The problem Dr. Ward states "is not the computers but with the way we use them."

The core of the ASML model is to build the "essential model," which describes the required behavior of the system. This can be further broken down into an environmental model, describing the environment in which the system operates, and the behavior model. The behavior model describes the behavior in response to external events in the environment.

Next, you build the implementation model that outlines the automated technology organization that embodies the required behavior. The implementation model is subdivided into three sections: the processor configuration model, the software configuration model and the organizational mode. The processor configuration model is a description of the processor layout that will carry out the required behavior. The software configuration model describes the organization of processes and data within each processor. Finally, the code organizational model describes the organization of computer instructions within each process. The final process is, of



course, to build the system from the model in hardware and software.

## Shortcomings

Actually, this isn't a whole lot different from the old traditional "systems analysis," "system design" and "systems development" phases with the exception of the representation of the flow of information. The traditional methods have always been fairly good for defining the type of data, where it came from, how it's processed and where it goes. The flaw has been its inability to represent communications lines between functions or people and how they interact with the system.

In this respect, the system Dr. Ward sets forth is an attempt to define this process in more detail. In doing this, it leaves out some of the more detailed descriptions of the data.

There are some aspects like feasibility studies that aren't really talked about much. In the more traditional systems, this is a well-defined procedure.

Also, while implied in various ways, Dr. Ward doesn't explain the feedback mechanism between the analyst and the department to test the correctness of the system. He states that the people for whom the system is developed must be involved, but, as is often the case, this involvement isn't always present to the extent that it's needed.

I think the book falls a little short of its intention of developing systems without pain. A large system is so complex that it's a long and painful process. The extensive use of examples in the development is helpful, but it's overdone in some spots. After finishing the book, I still feel somewhat unsure as to how I could use this system as a stand-alone design model. However, it did give me some good ideas. I don't think there's an ideal model or system that's perfect for all occasions, but this book does add to the tools you have to work with.

**Jerry Martin**  
Columbus, OH

## Macintosh! Complete

Doug Clapp  
Softalk Books, 1984  
7250 Laurel Canyon Blvd.  
N. Hollywood, CA 91605  
Softcover, 330 pp., \$19.95

Macintosh is going to put a lot of writers out of business. When a computer is easy enough for a child to use (literally—my four-year-old loads and runs MacPaint every chance he gets, and prints the documents in a chain, right from the Desktop), how can you write a how-to book about it? And, when almost all of the necessary information is already presented clearly in the user's manual, how does an author avoid simply rehashing that information?

Doug Clapp's solution, one favored by a number of Macintosh authors, is to write not only about the Mac's operating system, but the history of Mac development and the software (almost) available for it. The main difference between *Macintosh! Complete* and the other hurriedly published volumes is that most elicit yawns; Clapp's elicits smiles.

## Not So Complete

*Macintosh! Complete* is not as complete as you might like. It doesn't offer much practical advice: what's missing from the manual—using the font mover to make more room on the disk, setting the alarm clock—is also missing here. Clapp also passes up some good tidbits, like the hidden graphics symbols in MacPaint and MacWrite.

*Macintosh! Complete* is, however, written in Clapp's inimitable style (he's a columnist for *Infoworld*, computerdom's *Newsweek*), which I thoroughly enjoy. It also satisfies the new owner's need for something on his Mac bookshelf. We all like to read about what a good choice we made for our computer needs—or, perhaps, in the case of the Mac, desires.

Clapp may, in some cases, tell

you more than you want to know. For instance: windows have two general areas, the content region and the structure region; a window frame includes drag, grow and go-away regions; there are two kinds of dialog boxes; the area of memory that handles the Clipboard is the scrap. You don't need to know any of these terms to use the Mac; to some extent, in fact, it seems slightly sacrilegious to use them at all, since the whole structure of the Mac is user-intuitive and anti-terminology. However, being of the there's-a-name-for-everything school, I can't get enough of them.

Clapp discusses Microsoft's Multiplan and Chart, but barely mentions its Basic; on the other hand, Apple's MacBasic is given lots of coverage. This is not surprising, since Clapp and the Mac people have a close working relationship, but it's disappointing; regardless of the relative merits of the two Basics, it is only the Microsoft version that's available at this writing, four months after Mac's release.

## Not Too Serious

In his discussion of soon-to-be-available languages, Clapp almost explains the phrase "recursive language," then comments: "It is sometimes difficult to think about not thinking about thinking about recursion. At least I think it is sometimes..." It is this type of tangential aside, where the author is obviously not taking himself too seriously, that can keep you grinning while reading.

Clapp is an unabashed MacFan; the fact occasionally oozes out of his weekly column and is impossible to miss in this book. Of course, anyone who owns a Mac becomes a fan in a short time, although at different levels of abashment. You know you're going to start a Mac book collection, don't you? Even if you don't need any further information? So, get one that's enjoyable reading, like *Macintosh! Complete*.

**Sharon Zardetto Aker**  
Sussex, NJ



# The Apple Macintosh Book

Cary Lu

Microsoft Press, 1984  
10700 Northup Way  
Bellevue, WA 98004  
Softcover, 375 pp., \$18.95

Cary Lu's book on the Macintosh is little short of a publishing miracle: it came out at practically the same time as the computer, yet it's a well-written volume with real information in it.

I'd be hard-pressed to think of something that Lu left out of this book. There are 30 thick chapters that cover everything from fundamental Macintosh operations to the future of microcomputers in general.

Lu's knowledgeable writing has an easy-to-read style, and he manages to make occasional light remarks without getting silly (no easy task, judging by other computer books). There's also something endearing about an editor of *High Technology* who can flatly state that electronic glitches don't have reasons; they just happen.

It's difficult to choose any one thing for special comment, given the overall excellence of the book.

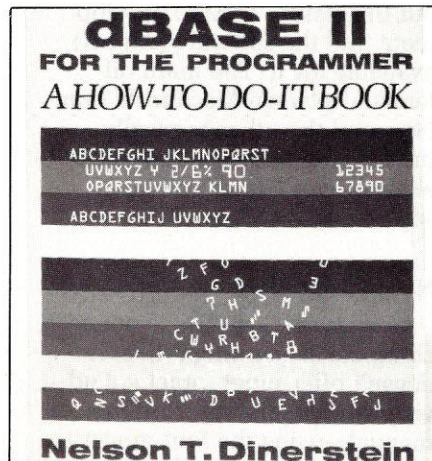
The section on computer communications is especially informative for someone who has yet to take the plunge. Bit rates, handshaking, protocol layers and such are well-explained; you still may not be able to grasp it all, but it won't be Cary Lu's fault! In fact, if you get lost among the various communications parameters, take his practical advice: "The quickest way to sort out data-link layer problems is to find someone else who has already—and do the same thing."

The description of Microsoft Word will whet your appetite for a heavy-duty Mac word processor. Of special interest to many readers will be the Macintosh vs IBM PC chapter, a head-to-head, point-by-point comparison. Guess who wins? It's the most balanced one-person debate I've ever seen, and seems, to this admittedly biased reader, an eminently fair evaluation of both systems.

Very few writers could make a smooth segue from telling you how to unpack a computer from its carton to inter-computer file-reading. Cary Lu does it seemingly effortlessly and, in between, offers food for thought as well as little tips such as how to get more ink out of your printer ribbon.

The Macintosh Finder has already been changed since this book's release, and no doubt there will be further upgrades for both the systems and software discussed in *The Apple Macintosh Book*. However, its scope will be satisfactory despite a lot of changes, and the publisher notes that future editions will cover new products. I wonder if buyers of this 1.0 release get a break on the 2.0 version? No matter, the original version is worth its price.

Sharon Zardetto Aker  
Sussex, NJ



## dBase II for the Programmer A How-to-Do-It Book

Nelson T. Dinerstein  
Scott, Foresman & Co., 1984  
1900 East Lake Ave.  
Glenview, IL 60025  
Softcover, 171 pp., \$19.95

Although it wouldn't have boosted sales, the title of this book should have been *A Treatise on dBase II*. A book with the term *How-to-Do-It* in the title suggests to me that it's a book for begin-

ners. While the first few introductory pages clearly state that this book is for people experienced in programming who have a reasonable familiarity with dBase II, very few read an introduction that carefully.

Since I own an IBM XT, I'm undoubtedly biased towards the DOS format and the extra capabilities available on the IBM version of dBase II as compared to the eight-bit CP/M version.

To his credit, Dinerstein indicates that the book was written using a Televideo TS802 computer and dBase version 2.3B. Thus, some of the author's comments are outdated in view of fixes that were provided in the more recent dBase II versions 2.3D and 2.4. Some of the programming could be made slightly easier by using the additional commands available on the 16-bit DOS operating system computers.

Dinerstein is an associate professor at Utah State University and the book is written in a text style; the author recites many of the techniques that he uses in writing a program along with a list of the language elements and an explanation of the way to use each element in Chapters 2, 3 and 4. In Chapter 5, he gives several hints to increase the programming speed or overcome bugs and other design problems in the dBase II program.

Chapter 6 is an illustrative example that uses the information previously provided for writing a program in the dBase language to show what's involved in interfacing with a client who wants to record sales information for each of his salesmen and to produce a report to determine the relative success of each salesman. In most instances, a client coming to a programmer isn't completely clear as to what he wants or how it's to be obtained. Rather, the client typically has a fairly vague idea of what he wants. This chapter deals with the programs necessary to achieve the desired result and how to modify the various databases as the problem is made more clear.



Chapter 7 lists a program that the author apparently wrote to take care of an accounts payable system for a small business. This chapter occupies 55 pages of a 170-page book or about a third of the contents. Although Chapter 8 lists the error messages and a comment as to what the error messages mean, this type of information is reasonably well provided in the manual that accompanies dBase II.

I wasn't particularly impressed by the book since a considerable amount of the material was merely filler for an experienced dBase II programmer.

However, I did learn something from the book because any programmer occasionally forgets items that were previously read and not used. Quite often, programmers playing with a program accidentally discover undocumented capabilities of a program. One example is the Restore command, which I had never used. But I also encountered many instances of programming approaches that I believe were either inefficient or at least less efficient than other approaches in previously published books on dBase II.

An example of an inefficient program is the one listed on page 64 that recites a way to empty a file. The approach is to delete all of the records and then pack the file. It has been my experience that there are faster ways to delete all the records from a file of 20,000 or so records than the packing process.

All of the useful information in this book could easily have been condensed into ten to 20 pages and sold for \$5, which would have been a worthwhile investment. However, the actual price of \$19.95 and the time necessary to peruse the entire manual makes it a less than desirable book for experienced programmers who are already reasonably familiar with dBase II.

**Bruce C. Lutz  
Richardson, TX**

## From the MC Bookshelf

If you're interested in the continuing saga of the computer industry's ups and downs, two new books are available. *Fire in The Valley: The Making of the Personal Computer* by Paul Freiberger and Michael Swaine (Osborne/McGraw Hill, 2600 Tenth St., Berkeley, CA 94710; \$9.95) takes you back to the early days when the personal computer was little more than the wild dream of a few electronics enthusiasts. It's based on interviews with major industry personalities and reads easily.

*The Coming Computer Industry Shakeout* by Stephen T. McClellan (John Wiley & Sons Inc., 605 Third Ave., New York, NY 10158; \$19.95) takes a hard look at where the computer industry is today and where it's headed, complete with predictions as to whom the winners, losers and survivors will be. McClellan is a computer industry analyst and vice president of Salomon Brothers Inc.

*How to Get the Most Out of CompuServe* by Charles Bowen and David Peyton (Bantam Books, 666 Fifth Ave., New York, NY 10103; \$12.95) is designed to save CompuServe users both time and money and to help potential users evaluate the system. It also has an on-line survival kit, including an electronic address book for major services, further reading available and how to reach the authors through the system.

Those of you who are totally confused by the wealth of acronyms in information technology fields may find some help in the *Dictionary of New Information Technology Acronyms*. Edited by Gordon, Singleton and Rickards, it's published by Kogan Page of London and distributed here exclusively by Gale Research Co. (\$56). The more than 10,000 entries of acronyms and abbreviations used in telecommunications, videotex, word processing, data processing, office automation, cable television, satellite communications and so on should make this a worthwhile desktop reference for those involved in fields utilizing advanced information

technology.

If you need help in understanding broadband local area networks (LANs), *Broadband Network Technology: An Overview for Data and Telecommunications Managers* by Edwin Bryant Cooper and edited by Christopher Poda (Sytek Press, 1225 Charlestown Road, Mountain View, CA 94043; \$19.95) is available.

This book includes detailed component explanations to help understand directional couplers, amplifiers and power supplies; introduces coaxial cable, taps, splitters and filters; covers rf component selections, amplifier characteristics and system design; and discusses typical applications.

*The Microcomputer User's Guide to Information Online* by Carol Hansen (Hayden Book Co., 10 Mulholland Drive, Hasbrouck Heights, NJ 07604; \$18.95) is an up-to-date collection of more than 100 on-line databases. Step-by-step instructions are provided for using on-line applications to send mail, talk to others, compute, program and form special interest groups.

Another new book from Hayden is *IBM PC Programs in Science and Engineering* by Jules H. Gilder and Scott P. Gilder (\$18.95). This is a collection of more than 100 ready-to-run IBM PC Basic programs for students, scientists and engineers. Each application includes a brief introduction to the program's algorithm, a program listing, sample run and explanation of the results.

*Practical Programs for the Epson HX-20* by Leo M. Conrad and Steven M. Zimmerman (Hayden Book Co.; \$16.95) is a collection of program applications for selected business and professional needs. Also from Hayden is *Business Program Portfolio for Your Apple IIe* (\$15.95) by George H. Hildebrand. It explains how to set up a computer system for printer business forms, how to create a menu system for programming and how to secure business records with password programs.

**N.K.**



# CALENDAR

## October 1-3 Chicago, IL

The University of Wisconsin-Stout has announced that a national conference, **Discovery '84: Technology for Disabled Persons**, will be October 1-3 in Chicago.

The conference will present formal discussions, demonstrations and workshops. An exhibition is slated to round out the events. For further information, telephone the University of Wisconsin-Stout at 800-45-STOUT, or from within Wisconsin, 800-22-STOUT.

## October 2-4 Seattle, WA

**Northcon '84**, a high technology electronics exhibition and convention, will be at the Seattle Center Coliseum in Seattle, WA. Seattle is also the host for **Mini/Micro Northwest '84**, which will be at the Seattle Flag Pavilion.

For information on either show, contact Nancy Hogan or Jerry Fossler at 213-772-2965.

## October 2-4 Singapore

**Infomatics '84**, the international conference of the Information Management Congress, is all set to take over the Singapore Hyatt Regency October 2-4. This year's congress will take a three-pronged approach, focusing simultaneously on 1) office automation, 2) micrographics and computer interfaces and 3) state-of-the-art applications.

In addition, there will be an exhibition and presentations by "celebrated authorities." One of the highlights of the congress is a discussion on "How to Cope with Change." For more information, contact IMC, PO Box 34404, Bethesda, MD 20817; 301-983-0604; Telex 904100 WSH.

## October 3 October 8-10 Shanghai

Not to be outdone by the IMC, the Forth Interest Group (FIG) has scheduled an **International Forth Interest Group Meeting** for October 3. October 8-10, the group will turn its attention to a **Forth Modification Laboratory Conference**, which will be at the Chiaco Tung University in Shanghai. The conference is designed to be a forum for sharing and discussing new proposals concerning Forth.

As you probably know, FIG is a nonprofit member-supported interest group devoted to the Forth computer language. For information on any FIG activities, call the FIG hot line at 415-962-8653 or write to the group at PO Box 1105, San Carlos, CA 94707.

## October 3 and 4 St. Louis, MO

Billed as the "premier regional high tech show of the year," the **St. Louis Computer and Accessory Show** will be at the A.J. Cervantes Convention and Exhibition Center October 3 and 4. The exhibit will feature hardware, software, peripherals, office automation products and even telecommunications.

For details, contact Class Productions, 4207 N. Clinton St., Ft. Wayne, IN 46805; 219-428-3448.

## October 4-7 Denver, CO October 25-28 Minneapolis, MN

CompuShows, which cover "every aspect of the computer and office equipment market," has scheduled two outings in October. The third annual **Rocky Mountain Regional Computer Show and Software Exposition** will take over the Merchandise Mart in Denver on October 4-7. At the end of the month, the show will regenerate as the third annual **Twin Cities Computer Show and Exposition** at the Minneapolis Auditorium.

Information on either show can be had from CompuShows Inc., PO Box 3315, Annapolis, MD 21403; 800-368-2066 or, from within Maryland, 301-269-7694.

## October 6 and 7 Colorado Springs, CO

The Broadmoor Hotel in the Colorado Exhibition Center has been chosen to house the sixth annual **Data Processing Management Association Computer Show** October 6 and 7.

The show, the DPMA's annual community relations function, is free and open to the public. Attendees will be treated to displays of hardware, software and peripherals—even information on computer room environmental control.

In addition to the exhibit, 12 professional seminars will also be offered. For further details, contact William Hoffman, Data Processing Management Association, Southern Colorado Chapter #218, PO Box 15255, Colorado Springs, CO 80935; 303-597-7883.

## October 8-10 San Francisco, CA

If you've left your heart in San Francisco, here's an excuse to return: the Association for Computing Machinery's conference, **The Fifth Generation Challenge**, will be at the San Francisco Hilton on October 8-10.



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The ACM conference will address the issue of the Japanese challenge as well as examine developments in artificial intelligence and robotics, among other topics. Several leading experts are slated to address the gathering.

For more information, contact ACM '84, the Fifth Generation Challenge, PO Box 32575, San Jose, CA 95152; 415-948-6306.

## October 8-11 Dallas, TX

John Naisbitt, author of the enormously popular *Mega-trends*, is on the lecture circuit this fall, and he'll be speaking at the Integrated Information Technology Conference and Exposition—a.k.a. **Intech '84**.

**Intech** has been designed for Fortune 1000 executives (and others) interested in the "education and advancement of the integration industry." The exposition, which will run October 9-11, offers exhibits and demonstrations of more than 100 companies' products.

The conference, which will begin one day earlier (October 8-11), will offer advice on implementing integrated information systems. For more information, contact Rosalind Boesch, National Trade Publications Inc., 800-638-8510 or 301-459-8383.

## October 9-11 Tulsa, OK

The third annual **Southwest Computer Conference** is ready to hold court at the Tulsa Convention Center October 9-11. Ten thousand business and industry people are expected to attend the event, which is sponsored by several professional and trade associations in Oklahoma. Fifty seminar presentations will complement a 250-booth exhibition.

For more information, contact SWCC, Box 950, Norman, OK 73070; 918-587-9550 or 405-329-3660.

## October 9, 16 and 23 Munich, Vienna, Milano

For the international set, three October dates have been reserved for the now-famous OEM-only **Invitational Computer Conferences**. The conferences are designed to offer OEM manufacturers the opportunity to meet one-on-one with manufacturers and system houses.

October 9, the conference will be at the Munich Sheraton; October 16 will see OEMs at the Vienna Executive Hilton and October 23 conferees will descend on the Milano Executive Hotel. For more information on any or all of the conferences, contact Beatrice Labbe, B.J. Johnson and Associates, 3151 Airway Ave., #C-2, Costa Mesa, CA 92626; 714-957-0171.

## October 10 and 11 Portland, OR

Computer coordinators, take note—the Computer Technology Program at the Northwest Educational Laboratory is continuing its series of workshops this month with two one-day gatherings. The entire series is designed for teachers and administrators who have taken on new roles in computer coordination in their school districts.

October 10, the topic will be the role of the computer coordinator in the community; October 11 will discuss curriculum planning for computer coordinators. Both seminars will be held at the NWREL Technology Center.

For more information, or to arrange for a similar workshop to be held in your area, contact Jim Pollard, NWREL Computer Technology Program, 300 SW Sixth Ave., Portland, OR 97204; 800-547-6339 or, from within Oregon, 248-6800.

## October 10-12 San Diego, CA

Local area networks are a subject on many people's minds these days, and **Localnet '84** is designed to meet this emerging interest head on. The meeting will be at the Sheraton Harbor Island Hotel in San Diego.

The conference will focus on two main topics—recent and prospective developments; and business considerations and implications. Speakers and paper presentations will round out the event. An exhibition is also planned. For more information, contact Online Conferences Inc., Suite 1190, 2 Penn Plaza, New York, NY 10121.

## October 10-12 San Diego, CA

With the breakup of AT&T, videotex technology is a wide-open field. The **Telcos and Videotex** conference will address deregulated and nonregulated communications October 10-12 at the Sheraton Harbor Island Hotel in San Diego. Other topics to be covered include videotex CPE, public access videotex and network support.

Further information is available from Online Conferences Inc., Suite 1190, 2 Penn Plaza, New York, NY 10121.

## October 11-14 Atlanta, GA

## October 18-21

## Miami Beach, FL

## October 31-November 2 Los Angeles, CA

The fall schedule of the **Computer Showcase Expos** marches on in October with three dates—two in the South (Atlanta and Miami Beach) and one on the West Coast (Los



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Angeles). All shows feature displays of a wide variety of hardware, software and peripherals that should be of interest to business, professional and corporate micro users. Also featured at each show is the Small Computer College, which offers elementary and advanced seminars at no additional cost.

For more information, contact The Interface Group Inc., 300 First Ave., Needham, MA 02194; 800-325-3330 or, from within Massachusetts, 617-449-6600.

## October 12-14 Toronto

The UCSD Pascal User's Society will hold its **Semi-Annual Meeting** at the Hotel Plaza II in Toronto, according to George Symons, USUS president.

Election of next year's officers will take place along with technical presentations, hardware and software demonstrations and a software library exchange. The group is also sponsoring two free tutorials—one's an introduction to the p-System and the other's an introduction to UCSD Pascal.

Non-USUS members are welcome to attend. For more information, contact the USUS Meeting Committee, PO Box 1148, La Jolla, CA 92038.

## October 12-14 San Antonio, TX

The second annual **Heart of Texas Computer Show** is scheduled to be in the San Antonio Convention Center October 12-14. Vendors will be on hand to display merchandise for small business and personal computer systems, robots and even games. For further information, contact the Heart of Texas Computer Show, PO Box 12094, San Antonio, TX 78212; 512-681-2248.

## October 12-14 Orlando, FL

The Great Southern Computer Shows have announced their fall lineup—October 12-14, the **Great Southern Business and Computer Show and Seminars** will be at the Orlando Centroplex Expo Center in Orlando. Future shows are slated for Jacksonville and Tallahassee.

All shows will feature hardware, software and peripherals, as well as data communications equipment, consulting services, seminars and more. For information, contact Great Southern Computer Shows, PO Box 655, Jacksonville, FL 32201; 904-356-1044.

## October 15-17 New York, NY

Interested in optical memory? Videodisks? Compact disks? The year 2000? Then the second **International Conference on the Future of Optical Memories, Videodisks, and Compact Disks to the Year 2000** should captivate you as well. The conference is sponsored by Rothchild Consultants and is scheduled to run October 15-17 at Loew's Summit Hotel in New York.

An impressive flock of noted speakers are slated to address the conference, which will begin with a general tutorial reviewing the status of optical memory development. For more information, contact PO Box 14817, San Francisco, CA 94114-0817; 415-626-1133.

## October 15-16 London

What's Pick? Whether you're a confirmed Pick enthusiast or a Pick neophyte, if you're planning to be in London October 15-16, don't miss the first **European Spectrum Show**. The show is designed to promote Pick-based computer concepts, which some perceive as "the best kept secret in the computer industry."

For more information, contact the International Database Management Association Inc., 9740 Appaloosa Road, Suite 210, San Diego, CA 92131; 619-578-3152 or Telex 697983.

## October 15-19 October 29-November 2 Washington, DC Area

The Armed Forces Communications and Electronics Association has announced its **1984 Fall Courses**. October 15-19, a course on Command, Control and Communications will be offered; October 29-November 2, Military Satellite Communications will be the topic. Unfortunately, both courses have a Secret Clearance Level—but persons with such clearance are welcomed to telephone 703-425-8500 or 800-336-4583.

## October 16-18 New York, NY

"Now that Unix is ready for business, is business ready for Unix?" That and other questions will be answered during a three-day conference and exposition, **UnixExpo**. More than 350 exhibitors will be on hand to complement the "multitrack" conference program and a variety of social functions. For information, contact National Expositions Co. Inc., 14 W. 40th St., New York, NY 10018; 212-391-9111 or Telex 135401 DIMCOMM.



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## October 18-21 San Francisco, CA

If you've a young software wizard around the house, take note—the **Computer 'n Kids Adventure Fair** is offering a software contest for kids up to age 17. Contestants whose programs are chosen for demonstration will receive a free T-shirt and free passes to the fair; winners will receive computer equipment.

In addition, the fair will offer special workshops and demonstrations. Entries should be sent to Special Programs Coordinator, Computers 'n Kids Adventure Fair, PO Box 2339, Berkeley, CA 94702; 415-848-6860.

## October 21-26 Philadelphia, PA

The American Society for Information Science announces that the **47th ASIS Annual Meeting** will be held at the Franklin Plaza in Philadelphia October 21-26. The meeting will discuss how the emerging information technology will affect the individual, the organization, the society and, by extension, the world. Several related papers will be presented.

For more information, contact the 1984 ASIS Convention, The Automated Office, 3401 Market St., Philadelphia, PA 19104.

## October 22 and 23 Merrimack, NH

The Hilton Hotel in Merrimack, NH will be the site of **A New England Conference: Microcomputers in Human Services**. The conference is sponsored by the Office of Human Development Services and the New Hampshire Social Welfare Council.

For more details, contact Lucy Metting, NHSWC, Box 1255, Concord, NH 03301; 603-228-0571.

## October 26 and 27 Chicago, IL

The Midwest States Conference on **Computers and Reading/Learning Difficulties** is slated for October 26 and 27 at the Sheraton International Hotel at O'Hare in Chicago. The conference is sponsored by the journal *Computers, Reading and Language Arts*.

Three-hour preconference workshops will be offered on October 26; more than 50 one-hour presentations will be featured on the 26th and 27th. Topics to be discussed include Logo, authoring systems, two national diffusion projects and learning difficulties.

For more information, contact Diane Frost, Educational Computer Conference, Department N, 1070 Crows Nest Way, Richmond, CA 94803; 415-222-1249.

## October 29 and 30 Eugene, OR

The University of Oregon's Continuation Center is sponsoring the third annual **Pacific Northwest Computer Graphics Conference**. The theme of the conference is "Applications on the Leading Edge"; several nationally recognized speakers will address the conference. New this year are a series of workshops and hands-on computer graphics demonstrations.

For more information, contact Conference Manager, Third Annual Pacific Northwest Computer Graphics Conference, Continuation Center, 333 Oregon Hall, University of Oregon, Eugene, OR 97403; 503-686-4231.

## October 29-31 San Francisco, CA

Jeff Pemberton, president of Online Inc., has announced that the fall lineup of **Online Conferences and Exhibitions** will stress the "what's new" aspects of the online field. This year, the conference will specifically examine the second wave of databases, systems and applications.

The conference will be at the San Francisco Hilton and Tower October 29-31 and will feature more than 100 speakers. For further details, contact Online Inc., 11 Tannery Lane, Weston, CT 06883; 203-227-8466.

## October 29-November 1 Amsterdam

If Atlanta wasn't enough, you can catch Comdex in its international garb at the third annual **Comdex/Europe**, which will be at the RAI Congress and Exhibition Centre in Amsterdam October 29-November 1.

For further information, contact the Interface Group, 300 First Ave., Needham, MA 02194 or, in Europe, Rivierstaete, Amsteldijk 166, PO Box 7000, 1007 MA Amsterdam, The Netherlands.

## October 30-November 2 New Orleans, LA

In conjunction with the Louisiana World Exposition, the 17th annual Microprogramming Workshop, **Micro-17**, will be October 20-November 2. The workshop will cover a wide range of programming topics and will feature paper presentations, panels, discussion groups and several task forces.

For more information, contact Registrar Cy D. Ardoin, Computer Science Department, University of Southwestern Louisiana, PO Box 44330, Lafayette, LA 70504.



# CLUB NOTES

## Epson QX-10 Owners Invited

Epson QX-10 owners are invited to join the National Epson QX-10 User's Group. It offers its members a large public domain software library, a newsletter, software reviews, operating systems articles, answers to technical questions and a Co-Op that makes computer articles and software

available to members at discount prices.

The national group's annual membership dues are \$25 (\$20 for college students). New members receive one free public domain disk. Write Box 1076, Lemont, PA 16851 to join or send \$1 for a sample newsletter. For more information, contact Richard Shoemaker at 814-237-5511 in the evening.

## First Ada User's Group Formed

The first user's group to form around a single Ada compiler and development system met for the first time in July at the Sheraton Regal Hotel in Hyannis, MA.

The TeleSoft-Ada User's Group is organized jointly by the Charles Stark Draper Laboratory, Cambridge,

MA, and Bell Aerospace/Dalmo Victor Operations, Belmont, CA, both major users of the TeleSoft-Ada compiler and TeleSoft.

For further information, contact Nancy Sodano, The Charles Stark Draper Laboratory, 555 Technology Square, Cambridge, MA 02139 (617-258-2180) or Steve Wersan, Dalmo Victor, 1515 Industrial Way, Belmont, CA 94002 (415-595-1414).

## CLASSIFIEDS

Classified advertisements are free and are intended for use by persons desiring to buy, sell or trade used computer equipment. No commercial ads are accepted.

Advertising text must reach us 60 days in advance of publication date (i.e., copy for March issue must be received by Jan. 1). The publisher reserves the right to refuse questionable advertisements. Mail copy to **Classified Microcomputing**, 80 Pine St., Peterborough, NH 03458.

**WANTED:** Good-looking living room-quality furniture for IBM PC plus monitor and Mannesmann Talley Spirit 80 printer. Prefer lockable, completely enclosed cabinet or desk. T. Woods, 2651 Pacific Way, Longview, WA 98632.

**FOR SALE:** Apple II Plus, 48KB, two disk drives with controller, green screen monitor III with stand, Integer Basic ROM card, micromodem II, Apple DOS tool kit, Applewriter II, approximately 80 disks and assorted software. \$2295. HP41CV handheld programmable calculator includes four nicads with external recharger. \$225. Jim Stephandis, 2620 Cold Spring Lane, Indianapolis, IN 46222, 317-634-0951.

**FOR SALE:** Complete sets of *Microcomputing*, 80 *Micro*, *BYTE* and others. Make offer. F. Winters, 7 Fawn Lane, Hilton Head, SC 29928.

**FOR SALE:** Apple IIe software pack, \$100. Contains word processor (WordStar), database manager and dozens of games and utilities. Cost over \$300; not compatible with new (nonApple) hardware. C. Mann, 8412 Vision Lane, Walkersville, MD 21793 or call 301-845-8847 (eves).

**WANTED:** Good IBM PC and portable PC with modem. Also word processor and report generator. C. Mann, 8412 Vision Lane, Walkersville, MD 21793.

**FOR SALE:** Ham Radio Station for only \$295. National 183 RCVR Apache TX-1 XMTR. Shure Mic Eico Scope. Documentation and more. 301-845-8847 (eves).

**WANTED:** *MAD Magazine/National Lampoon*-type editorial and cartoon material for national magazine targeted to kids with Apple computers. Send inquiries to Emerald City Publishing, PO Box 582, Santee, CA 92071.

**FOR SALE:** IBM-compatible Sanyo 550, 128KB, one disk drive, 11-inch amber monitor. WordStar and CalcStar included. Also Basic programming language. All for only \$870. Ray, evenings, 203-255-3170.

**FOR SALE:** Used Texas Instruments 763 silent 700 printing terminal with 20KB bubble memory, RS-232C, works well. Best offer—at least \$500. Contact Irving Wolfe, 206-282-9598.

**FOR SALE:** Almost new, excellent Qume QVT-102 green 80x24 terminal, \$550 delivered, firm. Contact Irving Wolfe, 206-282-9598.

**WANTED:** Members for our new Adam Club. Experience new programs. Write Charles Kolin, 4835 Edsal, Cleveland, OH 44124.

**FOR SALE:** HP-85 computer with A/P ROM, assembler ROM, matrix ROM, I/O ROM, HP modem, 32KB EAM and complete documentation—\$1595. Contact Larry Nicholas at 805-688-1495.

**FOR SALE:** Diablo P-11 dot-matrix printer, new; parallel interface, italics, underlining, compressed/expanded characters, ten-inch carriage, 100 cps. \$274 (list \$649) w/warranty. Erin Williamson, Rt. 2, 35 Totteridge Drive, Wellford, SC 29385 or 803-877-9828.

**WANTED:** I would like to use my knowledge of hardware and software to take the "dis" out of physically disabled. If you have a special need or need information, write Timothy McIlwee, RR2, Box 462A, Dundee, IL 60118. Some possibilities are: foot switch, keyboard hand-steadying grid, voice synthesizers, head-tilt switches, Braille-encoded keyboards, talking keyboards, sound-sensitive menu-driven programs. Preferred systems to work with are Sinclair QL, Sinclair 2068, Com 64, TRS-Color and Apple. Please describe your needs in detail. I am also interested in PC board layouts and schematics of any peripherals for any computer. SASE appreciated for replies.

**FOR SALE:** TRS-80 Model 100 Portable Computer. 32KB RAM, disk/video interface (single drive), cables (printer, modem and cassette), bar code reader, Epson MX-80 printer with Grafrax and numerous programs on disk. Asking \$1800 for the package (negotiable). Includes original packing, manuals, books and magazines. Mark Paulhus, 52 Dwight St., New Britain, CT 06051 or 203-224-3309.

**FOR SALE:** TRS-80 Model III Computer. 48KB RAM, two disk drives, printer cable, daisy-wheel II printer, SuperScript, Series I Editor Assembler (disk) and numerous programs on disk. Asking \$2200 for the package (negotiable). Includes original packing, manuals, books and magazines. Mark Paulhus, 52 Dwight St., New Britain, CT 06051 or 203-224-3309.

**WANTED:** Sharp PC-1500 pocket computer users who want to know how to convert your PC-1500 into a PC-1500A, how to extend its RAM, how to speed it up, how to define your own special characters for display, plotter and keyboard. For details, write to Christian Germelmann, Hauptstrabe 95, 3422 Bad Lauterberg 1, Germany.

**FOR SALE:** ADDS terminal model CONSUL 980-A. Best offer secures. Herbert, PO Box 725, New Brunswick, NJ 08903.

**WANTED:** College student needs donation of used Timex/Sinclair computer and equipment. For experimentation and class project. Will pay all postage. Imre Auersbacher, 41 King St., A2, Belle, NJ 07109.

**FOR SALE:** Interactive structured Z80 assembly language compiler. Screen editor. Public domain. Source incl. Eight-inch SSD CP/M. Two disks. \$20 or SASE for information. Steve Allen, 5016 48th SW, Seattle, WA 98136.

**WANTED:** Copy of the book, *Beneath Apple DOS* and/or Apple's DOS Toolkit manual. Will pay generously for the books and shipping. Scott Barnes, Star Rte., Parkersburg, PA 19365; 215-593-6454.

**FOR SALE:** British software for Sinclair and Commodore-64. J. Pugliese, 202 Wills Ave., Stanhope, NJ 07874.

**WANTED:** Questions about the SP/M 2.2 (CP/M-80) operation system. I will find the answers. Send SASE to Burton Bhavisyat, Rte. 1, Box 318, Moundsville, WV 26041.

**FOR SALE:** Heath H-88-5 cassette interface. Still in original carton. \$30. Send SASE to Mark James, 6151 22 Ave. SW, Naples, FL 33999.

**FOR SALE:** Albert 6502 Micro, 2DD drives, built-in parallel, serial, RGB, analog, RS-422 ports. Speech synthesizer on main board. Detached keyboard with function keys. Runs Applesoft and Integer. Six slots for 80 column and CP/M. Perfect condition. Koala pad and many programs included. Contact G. Smith, PO Box 9266, Fort Lauderdale, FL 33310.

**FOR SALE:** TRS-80 Model III, 48KB with speed-up board and four DD drives, includes cables. With software and some manuals including DOS Plus 3.4, DOS Plus 4.9, Multi-DOS 1.6, NewDOS 2.1, TRS DOS 1.3, operating systems, Scriptit & Copyart II, Word Processing, TRS-80 Profile Database, Maxi-Manager B.O. four-drive database, Dome bookkeeping, TRS-80 General Ledger, TRS-80 Payroll, TRS-80 Accounts Payable, TRS-80 Accounts Receivable, enhanced VisiCalc. \$2195 or best offer. Call Phil at 203-937-0106.

**FOR SALE:** Vector Graphics 3, 2600 series, 64KB expandable, two 600KB DD's, internal modem. Software includes Word Processing, Spreadsheet, Critical Path Scheduling, Communications. \$3750. (\$7500 value). Plus DS, Quad density Dyan Disk at \$2 each. Contact Frank Swinney, 620 SW 5th Ave., Portland, OR 97204 or call 503-224-4274.

**WANTED:** For Model III: CPU 48KB card, RS-232-C card, disk drive controller card, power supply card. Enrique Sanchez, PO Box 3370, Eagle Pass, TX 78853-3370.

**WANTED:** To buy or borrow: *How to Build a Microcomputer and Really Understand It* by Sam Creason (Wayne Green Publication). Harold May, 428 Phillippa, Hinsdale, IL 60521; 312-325-1910.



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The three magic letters still mean a lot, but the summer of 1984 will be remembered as the time buyers finally realized they could do better than the IBM PC. Big Blue's August 1981 model still dominates the 8088 market, but AT&T's 6300 and Compaq's Deskpro have pushed the faster 8086 CPU, with its true 16-bit architecture, into the spotlight. And Tandy, after eight months' waiting on Intel for sufficient chips, has reached full production and started an aggressive ad campaign for its even slicker 80186-based Model 2000.

By the time you read this, however, onlookers expect the empire to strike back. The third quarter should see the announcement of IBM's Advanced PC (also rumored as PCi, PC-2, PC III, Popcorn and Lord knows what else), a desktop that tops even Tandy's architecture by using Intel's 80286 microprocessor. The 80286 isn't necessarily faster than its brothers, but it has impressive multitasking power and can address a staggering 16MB of memory to their 1MB.

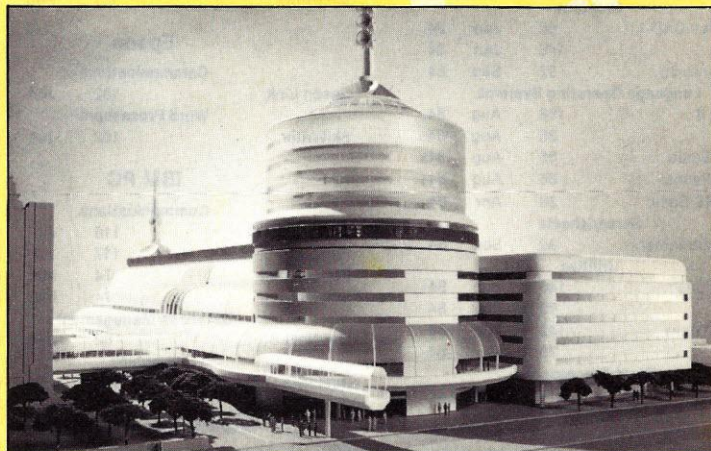
In fact, the Advanced PC sounds like more of a multi-user office system than a competitor for the AT&T, Compaq and Tandy micros, though there'll probably be a single-user base model. If it's priced in the \$6000-\$8000 range, as gossipers claim, it'll be almost irrelevant to the main event, the MS DOS wars in the \$2000-\$5000 arena.

What's the good word from Cupertino? Apple chairman Steve Jobs told *MicroScope*, "The Mac is going to halve in price by next year. It'll be like selling pocket calculators soon. . . . I want to put Macintosh inside a book in three years, or before, with a flat screen display [and] mass memory chips."

Jobs was less kind to competitors, predicting that IBM will "wipe out the Compaqs and Olivettis. . . . any firm that has a machine which runs IBM PC software will be squeezed out."

As for the two sole survivors, Jobs told the British magazine, "Both IBM and Apple will have proprietary software by the fall. The way our machines run applications or languages, whatever, will be a closely guarded secret."

Speaking of Apple, I'm not sure



Emperor Ming's supertanker meets the Crystal Palace: the Computer Museum of Canada, a \$12 million showplace on Toronto's Harbourfront, is scheduled to open in mid-1986. Among other attractions, visitors will be able to walk around the circuits of a room-sized microprocessor.

how deep their allegiance to eight-bit machines runs—there's lots of talk about "Apple II Forever," but after a few minutes the conversation usually turns to putting a 16-bit chip in the 6502 socket. Radio Shack, by contrast, admits that the Models 4 and 4P probably won't be around two or three years from now, but product manager David Frager isn't abandoning his Z80A-based charges in the meantime.

Notably, the Tandy workhorses are being cut to \$1299 each—"a killer price," Frager told *Microcomputing* in an interview at his Fort Worth, TX, office. "The Apple IIe's street price is \$200 above that, and its list price is \$500 above that." As for the revised Apple IIc, Frager said, "There are two ways to enhance the eight-bit market. Apple enhanced the machine; we reduced the price. And we'll both be successful."

"I have some super software coming for the 4," he added, "that'll show this is a serious business machine." Besides DoubleDuty, a \$70 utility that lets 128KB 4/4P owners toggle between two 64KB programs at once, Frager quipped that Tandy has finished its year-long struggle with Digital Research Inc. to debug Model 4 CP/M—"We're going to have a version of CP/M that works." To that, another Tandy executive present joked, "What did you have to do, go to Microsoft for it?"

Why did Hewlett-Packard send walnut pecan pies to computer magazine

offices? To promote InfoCorp's release of a retail study showing HP with "a larger-than-ever slice of the personal computer market pie"—up to third place, with 6.1 percent of the market to IBM's 33 percent and Apple's 20.7 percent. Tandy scored 5.2 percent and DEC and NEC three percent each.

Compaq, Kaypro, Columbia, Epson, Zenith, TeleVideo and everyone else filled InfoCorp's "others" category, which accounted for the remaining 29.1 percent of the market.

Two great press releases this month; the first advertised TelePsych, Dr. Timothy Miller's counseling service for those who'd prefer talking to a psychologist via computer and modem. The Stockton, CA, counselor's telecommunications number is 209-473-8296; registered clients are billed 7/10 cent per word sent and two cents per word for the therapist's replies. The press release assures callers that Miller won't cheat them with the classic Eliza program or a similar mock psychologist: "All replies are written only by Dr. Miller, who is a human being."

The other release invited an MC editor to the opening of a computer center in Bamberger's department store in King of Prussia, PA. The R.H. Macy & Co. subsidiary will stock IBM, Apple and Panasonic micros, but we were miffed by Bamberger's not wanting journalists to clutter its front door: "Kindly use our Furniture Entrance, rear of store off Goddard Blvd." □



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